The OIL and GAS JOURNAL

PRODUCING REFINING MARKETING

VOL. 23. NO. 40 TULSA, OKLAHOMA, FEBRUARY 26, 1925

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Name.....

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Production Up Again; Wortham Gains

Average daily production in United States week ended Feb. 21, 1,922,960 bbls. Gain from previous week, 6,557 bbls.

Bazette Area Appears More Promising With Test Drilling in Chalk and Completion Probable Within Week

Highest daily average estimated production last year, week ended August 23, 2,057,319 bbls. Lowest January 12, 1,871,143 bbls.

By Andrew M. Rowley

Wortham which has been mainly responsible for the decrease in crude oil production registered since the week ending January 17 when that field reached its peak, turned the other way last week and accounted for most of the increase of 6,557 barrels daily registered for the entire country. The increase, however, was not due to any new development in the field or the bringing in of new wells but to the fact old producers were cleaned out and increased their output as a result. Losses and gains recorded in other fields of the United States about balanced during the week bearing out statements made previously crude petroleum production had about reached an even keel and that little change might be expected until wildcat operations begin to bear fruit.

The Bazette area, northeast of the Powell Field in East Central Texas, entered more fully into the limelight early this week when the test of the Humphreys Oil Company found soft chalk at 2,137 feet and the hard Austin chalk at 2,160 feet and was drilling at 2,320 feet still in the chalk. The location of the test now seems to have been ideally made and the next week probably will tell the story of what might be expected in that area. Bazette has just been considered the most probable area of new quantity production and, for this reason, the well of the Humphreys Boyd Oil Company is being watched with more than ordinary interest.

Two other sections of Texas had important completions during the past week. In the South Liberty Pool, Mills Bennett brought in a well, offsetting the discovery well of that field, which started at the rate of 800 barrels and which is expected to increase this output when it clears itself. Acreage in that pool is cut into small parcels and much drilling is being done there with indications production of that pool will show a substantial increase in the very near future. In the Texas Panhandle, the scene of big natural gas production, the Crosbie Oil Company completed a well which made 50 barrels an hour for the first six hours. The one big handicap of this section of Texas which has held back its development is its distance from thickly populated districts and the consequent expense involved in laying pipe lines and transporting material.

Every increase in the price of crude petroleum brings nearer the time when such areas as the Texas Panhandle will be developed fully. Other areas in that portion of the country such as the Pecos Valley of West Texas and parts of New Mexico and Colorado undoubtedly will be scenes of increased development work when crude prices make operating far from bases of supply profitable. As shown in another story in this issue, crude oil producers of the country are receiving now approximately $1,100,000 more daily for their production than they would have for the same output at the first of this year, less than two months ago. At the same time, the higher prices permit a wider range of operations.

The outcome of the development at Bazette will have an important bearing on future crude oil prices. There is but little doubt that if the operations there fail to result in substantial crude production, further price advances in the near future may be expected. While the refined oil market is showing signs of a slight reaction and this may be reflected in the crude oil market, it is felt crude prices will be raised again within a comparatively short time.

It will require but little time to drill Bazette should the Humphreys Boyd well prove productive. Supply stores have been located near the scene of operations and pipe lines extend near the area, consequently, if a field is opened there, it will take a prominent place in the production column within a month. Even should Bazette prove to be another Wortham, the ultimate effect upon the oil industry will not be serious. Wortham served merely to postpone crude price advances for the time being and the industry was really benefited by the delay in the announcement of the raises. Fields in that area yield their oil quickly and it will require more than another Wortham to seriously impair the healthy condition of the crude petroleum situation as it exists now.

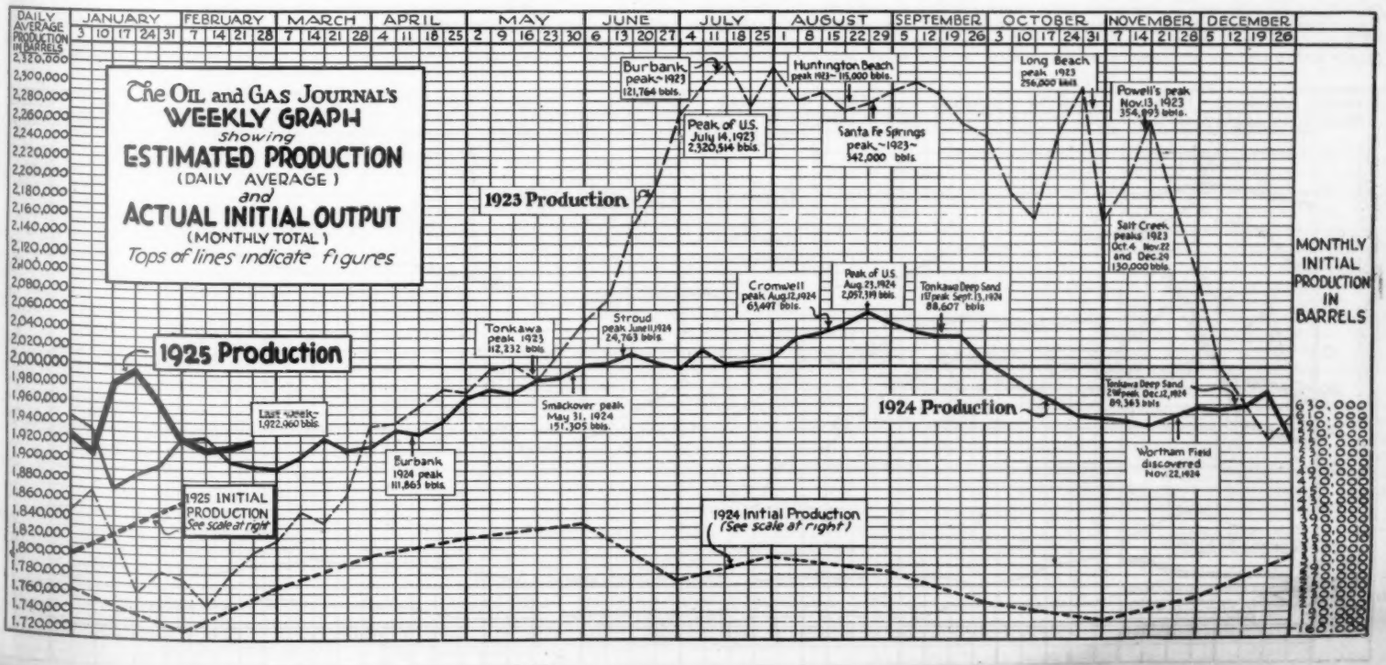
California registered an increase of 3,000 barrels daily during the past week due to developments in fields outside of the Los Angeles Basin. Kansas showed another gain with the Rainbow Bend and Graham Fields there attracting greater interest and obtaining a more important position in regard to production. Oklahoma recorded an increase of about 1,000 barrels daily with several completions adding importance to different areas.

PRODUCTION IN THE UNITED STATES

Estimated daily average crude oil production in the United States for the week ended February 21 and a comparison with previous week follows:

	Feb. 21	Feb. 14
Oklahoma—Northern Fields:		
Tonkawa	97,250	93,785
Burbank	56,980	57,670
Other Osage Fields	36,840	36,335
Cushing and Shamrock	22,980	23,045
Bristow and Eastern Bristow	34,840	35,865
Cromwell	38,460	38,820
Papoose	35,870	39,115
Northern Miscellaneous	97,380	95,840
Southern Fields	63,880	62,890
Total Oklahoma	484,480	483,365
Northern Louisiana	50,057	48,803
Arkansas—		
El Dorado and Calion	9,225	9,670
Smackover Light	32,230	32,445
Smackover Heavy	59,660	58,835
Stephens and Nevada	3,080	3,305
Total Arkansas	104,195	104,255
North Central Texas	132,460	134,425
Powell	58,260	56,200
Mexia, Currie, Richland, etc.	33,790	38,090
Wortham	74,830	68,450
Kansas	86,025	84,125
Total Mid-Continent Area	1,024,097	1,017,713
Gulf Coast	73,710	71,140
Southwest Texas	44,760	46,930
Eastern	98,680	98,625
Rocky Mountain Area	85,713	88,995
California—		
Santa Fe Springs	47,000	47,000
Long Beach	117,000	118,000
Huntington Beach	41,000	41,000
Torrance	40,000	40,000
Dominguez	52,000	53,000
Remainder of State	299,000	294,000
Total California	596,000	593,000
Total United States	1,922,960	1,916,403

→ Increase, 6,557 Barrels ←


The Oil and Gas Journal's
WEEKLY GRAPH
showing
ESTIMATED PRODUCTION
(DAILY AVERAGE)
and
ACTUAL INITIAL OUTPUT
(MONTHLY TOTAL)
Tops of lines indicate figures
DAILY AVERAGE PRODUCTION IN BARRELS
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
1923 Production
1924 Production
1925 Production
Burbank peak-1923 121,764 bbls.
Peak of U.S. July 14, 1923 2,320,514 bbls.
Huntington Beach peak 1923-115,000 bbls.
Santa Fe Springs peak,-1923- 342,000 bbls.
Long Beach peak 1923 256,000 bbls.
Powell's peak Nov. 13, 1923 354,893 bbls.
Salt Creek peaks 1923 Oct. 4 Nov. 22 and Dec. 29 130,000 bbls.
Cromwell peak Aug. 12, 1924 63,497 bbls.
Peak of U.S. Aug. 23, 1924 2,097,319 bbls.
Tonkawa Deep Sand 17 wells Sept. 13, 1924 88,607 bbls
Tonkawa peak 1923 112,332 bbls.
Stroud peak June 11, 1924 24,763 bbls.
Smackover peak May 31, 1924 151,305 bbls.
Last week- 1,922,960 bbls
Burbank 1924 peak 111,865 bbls.
1925 INITIAL PRODUCTION See scale at right
1924 Initial Production (See scale at right)
Tonkawa Deep Sand 7 Wells Dec. 12, 1924 89,363 bbls
Wortham Field discovered Nov. 22, 1924
MONTHLY INITIAL PRODUCTION IN BARRELS

Slightly Lower Prices in Oklahoma

Reactionary Trend Apparent in Gasolines and Kerosene. Market in Hands of Marketers. Neutrals Advanced 1 Cent

By C. O. Wilson

The Oklahoma (Group 3) refined market experienced a slightly reactionary price trend during the past week. Gasolines for the first time this year failed to show the accustomed weekly advance, prices on most grades, in fact, being ¼-cent lower than they were a week ago when the general price level was higher than at any time during the past year. Kerosene also failed to sustain all of the spurt in prices of the previous week.

The downward price trend also applied to fuel oil and distillates, the sellers generally lowering their quotations on all grades when they had material to offer in the open market. Gas oil is still firmer than fuel oil with no general change in price. The only class of products which advanced during the week was neutrals which are 1 to 1½ cents higher. Neutrals are the slowest lubricant in Oklahoma, the higher prices being entirely due to the last crude advance posted on February 12. Ever since the crude change was announced the few manufacturers in Okahoma have been adjusting their neutral price schedules upward and this action received almost unanimous support last week when the Mid-Continent Petroleum Corp. (Cosden & Co.), the largest manufacturer, announced a new schedule of prices. Cylinder stocks, although relatively strong, were not changed in price.

Buyers Oppose Advances

The spot market in gasoline is still in the hands of marketers. This has been true ever since the first few days of February when it became apparent that there was to be some opposition to the recent price advances both from domestic and export buyers. It was then that the material in the hands of marketers bought long in January and early February for February began to make its appearance.

This resale gasoline was bought from the refiners at from 1 to 4 cents under the present spot market and so the marketers have had no difficulty in underselling the refiners leaving them still an unusually wide margin of profit. A canvass of a large number of Oklahoma refiners on Monday and Tuesday showed that many of them were still quoting 13½ cents to the trade for 58-60 U. S. Motor with a scale of prices to as low as 13 cents. The marketers were offering the U. S. Motor grade freely at the latter price. Sales as low as 12½ cents were reported on shipments in transit and in cases where the resale agent had only a day or two to order out his shipments from the refineries. Indicative of the general market situation was the story told among the trade during the week of a refiner who lost a sale to a marketer who underbid him ½-cent and then ordered the gasoline out of his plant on a purchase made in January. Refiners were constantly being told of gasoline being offered their jobbing connections at ¼ to ¾-cent under the price at which they were willing to sell.

This resale material was coming from all sections of the Mid-Continent and adjoining areas. Practically all the refiners who have been selling on the spot market since the first of the year had sold gasoline for February delivery at a price of 13 cents or under for 58-60 U. S. Motor. Some of this went direct to jobbers, a majority of whom bought all their February requirements early in the month expecting higher prices. Jobbers in the Middle West were flooded with the resale material. One refiner in Illinois was reported to have sold over 200 cars to marketers and one company in Kansas more than 100 cars. The refiners had secured 12½ cents from the marketers who were offering the fore part of the week to dispose of it to jobbers at the same price.

March Outlook

Market observers agreed that this resale gasoline would probably absorb all the spot business over the remainder of February. For that reason refiners were mainly concerned with what March would have to offer the gasoline market. As just explained the forward selling in March was directly responsible for the break in the February market and with this in mind refiners are going slow in placing their March business.

One refiner reported a sale of 25 cars for March delivery at a price of 13½ cents for 58-60, 437 gasoline. Another refiner not located in Oklahoma is reported to have sold at the same price basis Group 3 for March and April delivery. Several others expressed the opinion that 14 cents would be a fair average price for March with few willing to consider April business except at a price 1 to 2 cents higher. Marketers and jobbers on the other hand are not so anxious to speculate for March. One marketer who has benefited substantially through forward buying since the first of the year stated the first of this week that his company would not pay 13 cents for March delivery of U. S. Motor. Others were equally as cautious.

With these varying prophecies it would be impossible to pick out any opinion regarding the March outlook and say it was representative. There are many market observers among the buyers and sellers who look for a quiet month in March with little change in the gasoline prices regardless of what happens to the crude and tank wagon schedules. There has come to be a general recognition of the fact that due to the favorable market situation which existed for the refiners the latter part of 1924 and the first month of this year, plant output is now too great to support further price advances in most products.

Cautious About Future

Provided no new fields make their appearance in the immediate future, the trade does not expect the present reactionary trend to continue long especially in gasolines. However, March is a month of adding to gasoline stocks and it has seldom witnessed advancing prices even when conditions were more favorable than they are at the present time. In commenting on this situation, one refiner said that in his opinion it would be better for all concerned if prices did remain stationary over March. He believes that that condition in the refined market would tend to slow up refinery operations and this in turn would prevent further crude price advances until April or May when the refiners would be drawing on their gasoline stocks to supply the spring and summer demand.

In this connection the Western Petroleum Refiners Association in its week-

(Continued on Page 206)

REFINED MARKET BAROMETER

There were few developments of major importance in refined markets during the past week, reports from all areas indicating a relatively quiet seven-day period. After a steady advance for several week's gasoline showed a reactionary price trend in the Middle West, Mid-Continent and Pennsylvania for February delivery. Quotations on future business indicated a firm market. On the East and West coasts, gasoline prices were unchanged. Kerosenes are inactive both for domestic and export shipments and refinery prices are lower at a few points despite additional tank wagon advances in the consuming markets. The seasonal dullness in distillates continues. Fuel oils are sluggish and prices are lower in several refining centers. Cylinder stocks are strong. Other lubricants are generally quiet.

Mid-Continent—Gasoline prices iincluding blends slumped slight in all areas with little activity in the spot market. Natural gasolines are also easier although prices are firmer than refinery gasolines. Kerosene market is slow and prices are lower in Oklahoma and Kansas. The fuel and distillate market has not recovered from the general sluggishness of the past month and average prices are lower than last week. Gas oil firm. Strong export demand for cylinder stocks. Neutral prices higher.

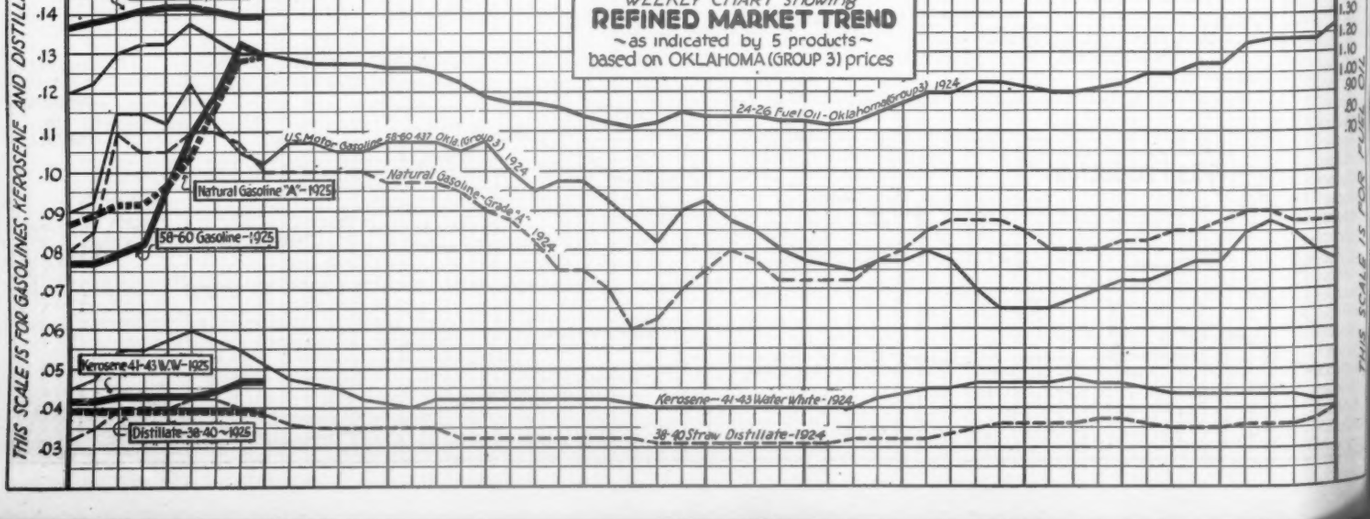
Atlantic Seaboard—Market generally firm with improvement in export movement. Strong demand for Diesel oil. Kerosene steady. Lubricating oils quiet. Summer oils advanced in price.

California—Market steady with no important price changes.

Pennsylvania—Gasolines easier. Cylinder stocks strong. Neutrals slow. Fuel oil and wax strong.

Gulf Coast—Lubricants firm following recent price advances. No change in gas and fuel oils.

Chicago—Resale gasoline in the hands of marketers weakens market. Light distillate demand. Gas oil steady. Kerosene and fuel oil slow. Lubricants more active.


CENTS PER GAL
JAN. FEB. MARCH APRIL MAY JUNE JULY AUG. SEPT OCT NOV. DEC.
DOLLARS PER BBL.
THIS SCALE IS FOR GASOLINES, KEROSENE AND DISTILLATE
THIS SCALE IS FOR CRUDE
The Oil and Gas Journal's
WEEKLY CHART showing
REFINED MARKET TREND
~as indicated by 5 products~
based on OKLAHOMA (GROUP 3) prices
24-26 Fuel Oil-1925
U.S. Motor Gasoline 58-60 437 Okla (group 3) 1924
Natural Gasoline "A"-1925
Natural Gasoline-Grade "A"-1924
58-60 Gasoline-1925
24-26 Fuel Oil-Oklahoma (group 3) 1924
Kerosene 41-43 W.W.-1925
Kerosene-41-43 Water White-1924
Distillate-38-40-1925
38-40 Straw Distillate-1924

Refiners to Convene at Kansas City

Annual Convention of Western Petroleum Refiners Association Will Be Largely Attended. Group Sessions Feature Program

By C. O. Willson

The refining industry of the Southwest, together with many visitors from more distant points on next Monday will begin assembling at Kansas City, Mo., for the annual convention of the Western Petroleum Refiners Association which opens on Tuesday morning and extends through Thursday. All indications point to a record attendance at the convention which is the most important meeting of the year for those connected with the refinery division of the petroleum world.

The accompanying program represents several months of planning on the part of the officers of the association who last year decided to enlarge the scope of activities of the annual meeting and make it more representative of all phases of the refining industry. Western refiners as represented by the Western Petroleum Refiners Association, have had numerous problems to face during the past year, with many still pending which will have to be solved during the year 1925. The past two years of general depression in the oil business from which it only recently began to recover, have weighed heavily on the shoulders of the average refiner of the Mid-Continent and adjoining areas, and he is now anxious to consider any constructive program which will prevent a duplication of the past during the coming year.

It is partially due to this situation that the association has arranged for a program which will make possible the collective discussion of problems through the medium of group meetings covering all departments of the refining industry. Many important railroad rate cases are pending at the present time; those charged with the direct responsibility of refinery operation can very profitably consider the numerous developments in plant construction and operation and finally there are the sales problems to which the all important phase of credits is closely linked. These general subjects will be covered in group sessions of sales and credit managers, traffic managers and plant operators.

Sales and Credit Managers

George D. Locke, vice president of the Barnsdall Refining Co., will preside at the meeting of sales and credit managers to be held Tuesday afternoon. F. L. Miller, vice president of the Miller Petroleum Co., one of the oldest refining organizations of the Mid-Continent Field, with refineries located in Kansas and Texas, will deliver a prepared address on the problem of refinery sales and credits. Mr. Miller has been associated for many years with his father, J. H. Miller, founder of the Miller Petroleum Co. and he is especially well qualified to speak on the subject which has been assigned to him.

Following an address by M. D. Creel, credit manager of the Marland Refining Co., the meeting will be thrown open to a general discussion of the subjects presented with the privilege of bringing up any other matters of interest to the sales and credit men. It is expected that this will develop into one of the most interesting open forum meetings of the convention.

Plant operators will assemble Wednesday morning. C. L. Henderson, vice president of the Vickers Petroleum Co. who was one of the first to realize the advantage which would accrue to the refining industry through a group meeting of the operators, will preside.

One of the phases of plant operation in which great strides has been made during the past few years is that of fractionation. Through changes in tower and still design refinery operation at many plants has been greatly changed. Yields of gasoline and other products secured through distillation have been increased at less cost than was possible through the inefficient methods of former years. However it is generally agreed among technical men that there is still room for improvement and this situation is reflected in the fact that improvements are constantly being brought to the attention of the operators.

Closely linked with improvements in fractionation is the problem of treating. Cracking and other developments in distillation and fractionating equipment have made possible a greater recovery of certain products but in the opinion of consumers this has sometimes been accomplished at a sacrifice in quality. The chemical engineer has solved part of the problem of overcoming these objections which have direct bearing as to the market value of the products. A great deal of research work has been done along this line in the Mid-Continent during the past two years, a period during which most of the cracking units have been installed and which are now an essential part of plant operation at a large number of refineries. Those in attendance at this meeting will be privileged to bring up for discussion any problem connected with their own operations and benefit from the advice of all present.

The discussion in regard to plant design and operation will be headed by H. W. Camp, general superintendent of the Empire Refineries, Inc., and W. A. Peters of the E. B. Badger's Sons Co. Mr. Camp, who will speak on the subject, "Developments in Design and Operation in Topping Plants" has general charge of the Empires four refineries, three of which are located in Oklahoma and one in Texas. Two of these refineries are complete and three have cracking units developed by the Doherty interests. The Empire Refineries, Inc., is generally recognized as a leader in refinery research work and the message of Mr. Camp will be based on practical improvements in skimming or topping plant design and operation which have been developed under his supervision.

Mr. Peters will give those present the benefit of several years experience in designing and installing refinery equipment. The concern which he represents is a pioneer in the manufacture of refinery equipment, specializing in that concerned with distillation processes.

Dr. F. W. L. Tydeman of the Roxana Petroleum Corp. will explain to operators how losses due to corrosion can be reduced. Ray Miller, safety engineer of the Marland Refining Co. will discuss safety work in a modern refinery.

Two other speakers on technical subjects will be heard at the breakfast Thursday morning. H. L. Shoemaker, assistant chief engineering of the Standard Oil Co. of New Jersey, will discuss "Fire Prevention." Mr. Shoemaker has been connected for several years with the fire prevention methods of the New Jersey company, the largest refining organization in the United States.

Mr. Gray, president of the Gray Process Corp. of New York City will explain recent developments in refining cracked products in the vapor phase. Mr. Gray is a practical plant operator, who has invented and installed several processes in refinery operation.

Of general interest to the entire membership will be the annual reports of F. A. Pielsticker, president and Fayette Dow, counsel of Washington, D. C. These reports will not only review the association's activities during the past

(Continued on Page 211)

PROGRAM ANNUAL CONVENTION WESTERN PETROLEUM REFINERS' ASSOCIATION
March 3, 4 and 5, Kansas City, Mo.

FIRST DAY
Tuesday, March 3, 9:30 a. m.
Registration, Mezzanine Floor, The Muehlebach Hotel
TRAFFIC MANAGERS' MEETING
Colonial Ball Room
AFTERNOON SESSION, 1:30 p. m.
President F. A. Pielsticker Presiding
Reports—President's Annual Address; Washington Counsel's Address.
CREDIT AND SALES MANAGERS' MEETING
Colonial Ball Room
George D. Locke, Vice President, Barnsdall Refining Co., Presiding.
"Relation of Sales Department to Credit Department."—F. L. Miller, Vice President, Miller Petroleum Co.
Discussion.
"The Problems of Credits."—M. D. Creel, Credit Manager, Marland Refining Co.
Discussion.

SECOND DAY
Wednesday, March 4, Morning Session 9:30
TECHNICAL MEETING
Colonial Ball Room
C. L. Henderson, Vice President, Vickers Petroleum Co., Presiding
"Treating."—Dr. C. K. Francis, Consulting Engineer.
Discussion.
"Corrosion in a Petroleum Refinery."—Dr. F. W. L. Tydeman, Roxana Petroleum Corp.
Discussion.
RECESS
"Development of Distillation and Fractionating Equipment;" "Fractional Distillation in the Petroleum Refinery."—W. A. Peters of E. B. Badger's Sons Co.
Discussion.
"Developments in Design and Operation in Topping Plant."—H. W. Camp, General Superintendent, Empire Refineries, Inc.
Discussion.
"Safety Work in Petroleum Refineries."—Ray Miller, Safety Engineer, Marland Refining Co.
Discussion.
EVENING 7:00 p. m.
Dinner and Smoker, given by the Kansas City Oil and kindred interests at Kansas City Athletic Club, with entertainment afterwards.
Theater party for ladies.

THIRD DAY
Thursday, March 5, 9:00 a. m.
Breakfast, The Tea Room
President F. A. Pielsticker Presiding
"Fire Prevention."—H. L. Shoemaker, Assistant Chief Engineer, Standard Oil Co. of New Jersey.
"Refining Cracked Products in the Vapor Phase."—T. T. Gray, President, Gray Process Corp.
EXECUTIVE SESSION—Members Only
Election of Officers and Directors.
ANNUAL BANQUET 7:00 p. m.
"The Western Refiner—His Place in the Industry."—Richard Airey, President, Asiatic Petroleum Co.
Sidney Samuels, Attorney, Fort Worth, Tex.
(Other speakers to be announced later.)

SPECIAL SECTION

A special section, including rotogravure, with pictures of the entire membership of Western Petroleum Refiners Association will be found beginning on page 64 of this issue. The section includes a number of feature articles of a special interest to refiners.

Watchorn Pool - Pawnee County Ok.

Famous 101 Ranch Has Skimming Plant

All Phases of Oil Industry Now Represented on Estate Containing Best Part of Watchorn Pool and Historic Kay County Well

By C. D. Lockwood

The producing, refining and marketing branches of the oil business have become so inseparably interwoven during the past few years that it is the rule rather than the exception for a refiner to have his own source of crude supply and his own pipe line to convey the raw product to his plant. The owners of Oklahoma's newest "refinery" however, go that one better, and the Miller Brothers' owners of the 101 Ranch near Ponca City, Okla., believe they are just about in a class by themselves as refiners, controlling not only their crude supplies but the consumption of their products as well. And as soon as workmen finish laying their 2-inch pipe line from the South Ponca Field, which is on the ranch, to the new 100-bbl. skimming plant which is just being completed next to the modern and up-to-date meat packing plant, all phases through which a barrel of crude oil passes from the time it leaves the sand until it passes through the exhaust pipes of automobiles, trucks and tractors, can be observed within the boundaries of the Miller property and within a radius of 2 miles.

A Prolific Pool

The 101 Ranch is known practically the world over for its wild western shows, its annual rodeos, its Indians and cow boys, its herds of buffalo and elk, its flock of ostriches, and its circus animals. It is also famous as the home of the largest herd of purebred registered Duroc-Jersey hogs in the world and the largest herds of purebred registered Holstein and Shorthorn cattle in America. And yet outside of the local district around Ponca City there are comparatively few persons who associate the ranch with important oil development, although old timers remember the 101 Ranch Oil Co., and know that the first well drilled in the Ponca City territory was located on the 101 Ranch, just a short distance from the spot where the "White House," the palatial residence of the Miller Brothers, now stands. Figures show, too, that last year the gross production of crude oil on the ranch properties totaled nearly 1,000,000 bbls. At the present time, some 23 oil companies, from the largest Standard subsidiaries, to large and small independent concerns, have about 10,000 acres of the Miller property under lease and were producing in the latter part of February approximately 8,500 bbls. of crude daily on these leases, a large part of which was coming from the Watchorn or Otoe Pool, in western Pawnee County. The bulk of this prolific pool, producing from below the Mississippi lime, is located on acreage belonging to the Miller estate and is considered a part of the far-flung 101 Ranch which now comprises in all more than 110,000 acres. Not all of this, of course, is owned in fee, some thousands of acres being leased from the Indians for grazing land, but the land belonging outright to the estate is counted by the tens of thousands of acres.

Miniature Refinery

The completion of the miniature but practical and bona fide refinery rounds out a list of diversified industries flourishing on the ranch which make it a veritable empire within itself. The last of the numerous great ranches which formerly added color to the western plains, the 101 Ranch has kept pace with the development of the section of Oklahoma in which it is located and in the course of the past 10 years has added to its numerous attractions and natural resources a modern dairy, a packing house, ice plant and cold storage, a large power and electric lighting plant, in addition to churches, schools and houses to care for the hundreds of people for whom the ranch provides employment.

Last year, the Miller Brothers spent $2,500 for gasoline which was consumed on the ranch and sold at the filling station in front of general store and office. Ten cars of kerosene were also required in 1924 to keep the tractors going on the hundreds of acres of farming land under cultivation on the ranch. And in addition to this consumption the packing and ice plants were using about 20 bbls. of crude oil daily as fuel under their boilers. This was royalty oil obtained from wells on the ranch property.

Since the residue oil from a skimming plant after taking off the gasoline and kerosene makes just as good or better fuel than the crude in its original state, the idea of the refinery was conceived. The only products of this plant that will be sold in addition to the ranch requirements will be those handled at the 101 filling station, and the plant will be operated only as the consumption demands.

Simplicity of Installation

The accompanying picture shows the simplicity of the installation. There is but one still of vertical type, shown on the left of the photograph. The cooling towers were already in place, having been built some time ago for use in connection with the ice plant. Steam is obtained from the boilers in the packing plant, so no new boilers had to be installed. No additional overhead is entailed by the refinery, either, as the two engineers in charge of the packing plant and power house will supervise the operations when the plant is running. It is practically fool-proof, anyway, according to W. A. Hawley, of Cushing, the engineer who constructed it. Workmen are shown in the picture putting on the finishing touches to its general appearance. The total cost of installing the refinery was only about $10,000.

The casual visitor to the ranch is constantly reminded of its intimate association with the oil history of the Ponca City district. Odd bits of oil well equipment have been put to various uses around the place and some ingenious ideas have been displayed. For instance, the roof of the horse barn, one of the largest private buildings of its kind in Oklahoma, capable of housing 165 head of horses, is supported by posts made of old 8-inch well casing. It might be mentioned in passing that the barn is fairly well filled now, a shipment of genuine bronchos having arrived from Texas last week for use in the 101 Ranch show, which is going on the road again this year for the first time since the World War.

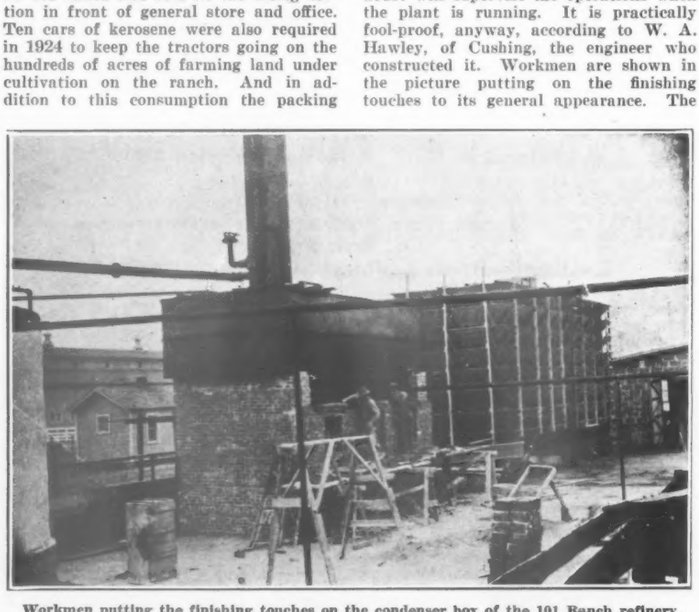
One of the first, if not the initial, leases secured in Oklahoma by E. W. Marland in 1908 was purchased from the Miller Brothers, and in February of 1909 a location was made for the well which was not only the first hole drilled for oil in Kay County but the first in Oklahoma west of the Osage Nation. It was a failure, due to adverse conditions and inadequate tools, but a second location was made, on the 101 Ranch, and in the spring of 1910 a large gasser was brought in. Shortly afterward, E. W. Marland, W. H. McFadden, J. C. McCaskey, Col. F. R. Kennedy and others organized the 101 Ranch Oil Co., which continued in operation in the Ponca Field until it was absorbed by the Marland Refining Co., in 1917. Of the first eight wells drilled by this company, seven were gassers. The ninth effort was completed in June of 1911 as an oil well and opened up a vast area including such rich fields as Newkirk, Garber, Billings, Blackwell, Burbank and Tonkawa. This first well started off at 125 bbls. daily and was still making 65 bbls. two years later.

It is a noteworthy fact that this original oil producer was drilled on land belonging to an Indian by the name of Willie-Cries-for-War. The lease war was on immediately and has never since shown any signs of diminishing.

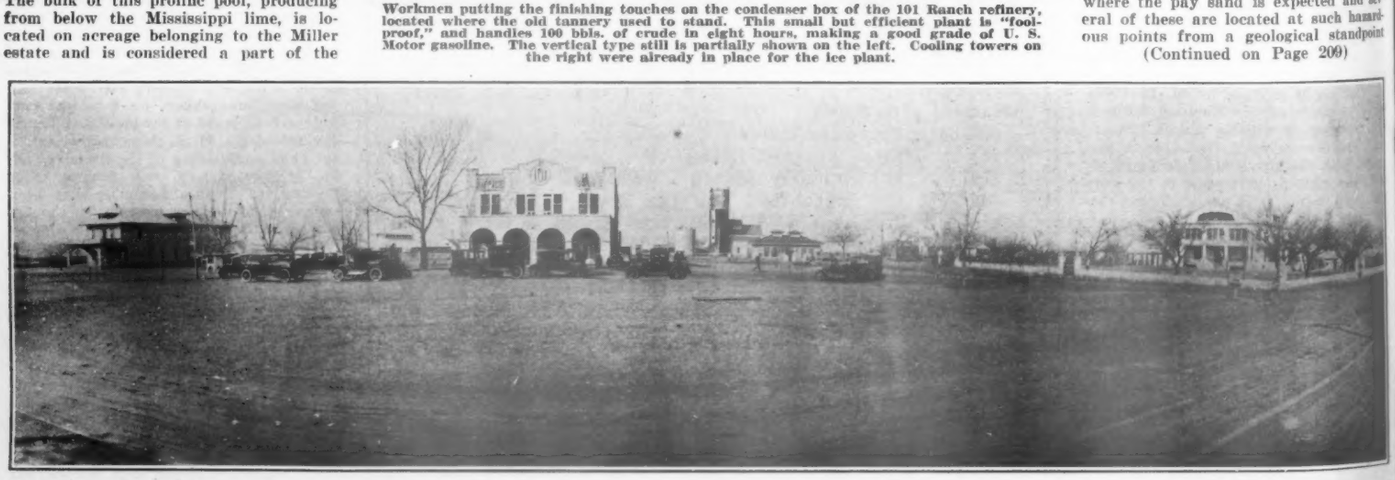
Tests Under Way

No story of the 101 Ranch would be complete without a brief resume of its most productive oil properties, comprising the best leases in the Otoe or Watchorn Pool. This field is especially interesting at this time because numerous tests there are approaching the depth where the pay sand is expected and several of these are located at such hazardous points from a geological standpoint

(Continued on Page 209)



Workmen putting the finishing touches on the condenser box of the 101 Ranch refinery, located where the old tannery used to stand. This small but efficient plant is "fool-proof," and handles 100 bbls. of crude in eight hours, making a good grade of U. S. Motor gasoline. The vertical type still is partially shown on the left. Cooling towers on the right were already in place for the ice plant.



The famous "White House," palatial residence of the Miller brothers, is shown on the right of the above photograph. In the center is the general store and filling station and the office. In the background can be seen the ranch cafe and some of the barns and other buildings that house the diversified industries operated on this little "empire."

Oil Board Takes Up Marketing and Use

Issues Questionnaires on Refining and Distributing Capacity, and Best Utilization of Motor Fuel and Lubricants

WASHINGTON, D. C., Feb. 23.—Officials of the country's most important oil companies who are familiar with the problems attending the distribution of crude petroleum and refined products today were asked to transmit to the Presidents' Oil Conservation Board such information and constructive suggestions as may contribute to the work of the board.

Secretary of the Interior Work, as chairman, in making public a letter addressed to the oil industry, explained that the board was anxious to know if there is either insufficiency or overexpansion in physical equipment (pipe lines, tank cars, etc.) for efficient distribution of petroleum and its products, if there are too many "links in the chain" from producer to consumer, if there are too many retail outlets for the maximum efficiency in distribution, etc.

The board likewise suggests that "various proposals have been made regarding restriction of both imports and exports aimed at a more logical and economic system of supply of both crude and refined products from the international viewpoint. We export large quantities of petroleum products but at the same time import a large proportion of our crude petroleum supply. Is there any preventable economic waste in the oil situation from the angle of world commerce?"

The industry is asked also "what is your opinion as to the existing total refining capacity of the country as related to present and future consumption requirements? Are the refining plants efficiently distributed with relation to supply of crude and to domestic consumption and export requirements? Are 'exchange' facilities economically desirable?"

Distribution Phases

The letter in full follows:

"In undertaking its study this board realises the many sided character of the problem before it. Not only the broad economic and legal phase of the question must be considered but the various phases of the distribution of petroleum and its products demand attention and an adequate survey of the subject.

"In considering the question of possible wastes in the distribution of petroleum and its products, we are confronted with the inadequacy of fundamental data. The first step, therefore, is to determine, if possible, what conditions in the distribution of these products may be the sources of waste, and to obtain as much basic material as may be available in regard to such conditions and their possible correction.

"(1) What, in your opinion, are the major causes of waste in distribution (a) of crude petroleum, and (b) of refined products? (c) Have you any suggestions as to methods of determining the extent of such waste and of curtailing it?

"(2) It can be said, by and large, that one of the most dangerous of all wastes is that train of events, risk, speculation, inflation and deflation, incident to lack of information as to national stocks, production and consumption. Are present statistics on production, consumption and stocks of crude petroleum and refined products adequate as to accuracy, frequency, timeliness and scope? If not, have you any suggestions as to what additional statistics would be desirable? Should these be prepared by the industry itself, or with the cooperation of the Government? Would these additional statistics be of sufficient value to justify the expense of labor and preparation?

"(3) (a) Is there either insufficiency or overexpansion in physical equipment (pipe lines, tank cars, etc.) for efficient distribution? (b) What is your opinion as to the existing total refining capacity of the country as related to present and future consumption requirements? (c) Are the refining plants efficiently distributed with relation to supply of crude and to domestic consumption and export requirements? (d) Are 'exchange' facilities economically desirable?

Service Stations

"(4) Considering the possibilities in the elimination of waste in retail distribution, (a) Are there too many "links in the chain" from producer to consumer? (b) Are there too many retail outlets for the maximum efficiency in distribution? The more or less elaborate roadside filling stations of the present day are, as a rule, convenient, pleasing to the eye, an assurance of quality, and a community asset; what are the economics of this extensive duplication of facility existing and projected? If not justified, what remedy do you suggest? (c) Forms of waste common in industrial distribution generally are reconsignment, crosshauls, cancellation of orders, and similar practices. Are these phases of wholesale or retail distribution particularly significant in the petroleum industry? To what extent can permanent preventive measures be applied?

"(5) What are the opportunities, either in this country or abroad, for the elimination of waste in connection with the distribution of petroleum for export?

"(6) Various proposals have been made regarding restriction of both imports and exports aimed at a more logical and economic system of supply of both crude and refined products from the international viewpoint. We export large quantities of petroleum products but at the same time import a large proportion of our crude petroleum supply. Is there any preventable economic waste in the oil situation from the angle of world commerce?

"(7) Are the physical facilities for distribution (pipe lines, tankers, tank cars, loading and unloading facilities, tank trucks and various types of small containers) being used to best advantage?

"(8) Is there adequate control of evaporation and leakage losses of petroleum and products while in storage and transit?"

Marketers Included

Among those to whom the letter was addressed are:

Allen, F. G., president South Dakota Independent Oil Jobbers' Association, Madison, S. D.
Anderson, A. F., president Continental Refining Co., Oil City, Pa.
Barneson, Capt John, president General Petroleum Corp., Alaska Commercial Bldg., San Francisco, Cal.
Beaty, A. L., president The Texas Co., 17 Battery Place, New York City.
Benson, R. D., chairman of board, Tide Water Oil Co., 11 Broadway, New York City.
Black, Thomas, vice president and general manager, Standard Oil Co., of Kansas, Neodesha, Kans.
Bush, R. D., California State Mining Bureau, Ferry Bldg., San Francisco, Cal.
Callaghan, A. J., president American Oil Men's Association, 10 S. La Salle St., Chicago, Ill.
Coombe, A. P., president Standard Oil Co. of Ohio, East Ohio Gas Bldg., Cleveland, Ohio.
Coons, S. W., president Standard Oil Co. of Kentucky, 426 W. Bloom Ave., Louisville, Ky.
Coryell, L. L., president Nebraska Independent Oil Men's Association, Box 446, Omaha, Neb.
Cosden, J. S., Tulsa, Okla.
Cramer, S. S., president Wisconsin Independent Oil Jobbers' Association, Oconomowoc, Wis.
Crawley, C. E., vice president Sinclair Consolidated Oil Corp., 45 Nassau St., New York City.
Davis, William N., president Mid-Continent Oil & Gas Association, 505 Cosden Bldg., Tulsa, Okla.
Dawes, Henry M., Pure Oil Co., Columbus, Ohio.
Day, Dr. David T., 713 19th St., N. W., Washington, D. C.
DeGolyer, E. L., vice president and general manager, Amerada Petroleum Corp., 65 Broadway, New York City.
Deterding, H. W. A., president Shell-Union Oil Corp., 65 Broadway, New York City.
Enz., F. C., president Indiana Independent Petroleum Marketers' Association, 310 N. Meridian St., Indianapolis, Ind.
Folger, H. C., chairman of board, Standard Oil Co. of New York, 26 Broadway, New York City.
Graham, Col. J. H., president Indian Refining Co., Lawrenceville, Ill.
Jeffries, D. H., president Texas Oil Jobbers' Association, Fort Worth, Tex.
Karb, George J., president Ohio Petroleum Marketers' Association, Columbus, Ohio.
Keeney, O. P., president National Petroleum Association, Munsey Bldg., Washington, D. C.
Kingsbury, K. R., president Standard Oil Co. of California, Standard Oil Bldg., San Francisco, Cal.
Kuehnle, L. F., president Iowa Independent Oil Men's Association, 225 Fifth St., Des Moines, Iowa.
Lackey, M. F., president Arkansas-Tennessee Oil Marketers' Association, Little Rock, Ark.
Lyons, Col. U. G., president National Petroleum Association, Munsey Bldg., Washington, D. C.
Marcell, L. L., president White Eagle Oil & Refining Co., Federal Reserve Bank Bldg., Kansas City, Mo.
Marland, E. W., president Marland Oil Co., Ponca City, Okla.
Matthews, A. S., president New York State Petroleum Marketers' Association, Syracuse, N. Y.
Mellon, W. L., president Gulf Oil Corp., Frick Bldg. Annex, Pittsburgh, Pa.
Murray, J. L., president Illinois Petroleum Marketers' Association, 521 Main St., Peoria, Ill.
Nicholas, L. V., president National Petroleum Marketers' Association, 76 W. Monroe St., Chicago, Ill.
Parriott, F. B., president Transcontinental Oil Co. Benedum-Trees Bldg., Pittsburgh, Pa.
Pielsticker, F. A., president Western Petroleum Refiners' Association, Cosden Bldg., Tulsa, Okla.
Pogue, Joseph E., consulting economist, 42 W. 12th St., New York City.
Prizer, Edward, president Vacuum Oil Co., 61 Broadway, New York City.
Ragle, H. H., president Michigan Independent Oil Men's Association, Saline, Mich.
Requa, M. L., 315 Montgomery St., San Francisco, Cal.
Skelly, W. G., president Skelly Oil Co., Tulsa, Okla.
Standard, W. L., president Independent Petroleum Marketers' Association of California, Inc., 930 Marsh-Strong Bldg., Los Angeles, Cal.
Stewart, Col. R. W., chairman Standard Oil Co. of Indiana, 910 S. Michigan Ave., Chicago, Ill.
Stewart, W. L., president Union Oil Co. of California, Union Oil Bldg., Los Angeles, Cal.
Teagle, W. C., president Standard Oil Co. of New Jersey, 26 Broadway, New York City.
Thorne, Harold B., vice president Pierce Oil Corp., 111 Broadway, New York City.
Van Dyke, J. W., president Atlantic Refining Co., 260 S. Broad St., Philadelphia, Pa.
Weller, D. R., president Standard Oil Co. of Louisiana, Baton Rouge, La.
Wilson, J. S., president Southern Petroleum Dealers' Association, Camden, S. C.
Wolf, J. M., president Minnerota Petroleum Association, 638 Builders Exchange, Minneapolis, Minn.
Wrather, W. E., Dallas, Tex.
Wylie, H. G., president Pan-American Petroleum & Transport Co., 120 Broadway, New York City

Waste of Fuel and Oil

Waste in the utilization of petroleum products, especially in view of the reported diminishing resources in crude petroleum in this country, is regarded by the President's oil board as an important phase of its general inquiry into the country's oil situation. In another letter today directed to important officials of the industry the Government makes inquiries which are of particular importance to the 15,000,000 motor car users in the United States. The board asks the industry its opinion as to "what extent would the public tolerate less convenience, comfort, or speed of operation in order to eliminate waste."

The letter in full follows:

"In its consideration of the problem of diminishing resources in crude petroleum with an increasing demand for its products which the country is facing, the board regards waste in the utilization of these products as an important phase.

"One of the major factors in the demand for crude petroleum is the quantity of motor fuels and lubricants required and elimination of waste in their use is therefore of major importance.

"This letter is addressed to you requesting your individual views on a number of phases of the problem of waste in motor fuel and oil utilization, as a guide to this board in considering the existing petroleum situation. It is the belief of the board that consideration of the following topics will suggest to you sundry

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CONSERVATION BOARD QUESTIONNAIRE SEEKS TRANSPORTATION LOSS DATA

WASHINGTON, D. C., Feb. 21.—With approximately 350,000,000 bbls. of crude petroleum stored in pipe lines and tank farms, the president's oil board has called upon the oil industry for statistics and pertinent data that will enable the board to determine a solution, if possible, of the problems relating to the transportation of crude oil.

The board states it is generally recognized there is a certain loss of oil between the gauge tank and the refinery, and the representative oil men of the country are asked to estimate, if they can, this total loss and to give their opinion as to what practical method should be adopted for reducing such losses.

Relative to the oil in the pipe lines and on tank farms, the board is anxious to know the view of the industry as to the average monthly loss from this storage and what, if any, means can be employed for reducing the losses or waste.

These phases are of vital import to the industry, explained Secretary of the Interior Work, chairman of the Federal Oil Conservation Board, of which Secretary Weeks, Secretary Wilbur and Secretary Hoover are members. "If the constructive leaders of the industry can assist the Government in working out remedial plans for the benefit of both, then the public will correspondingly benefit, and, in view of the importance from an economic viewpoint, of preventing unnecessary losses, the board will be glad to hear from all of those who have given the matter serious attention."

Many-Sided Problem

In a letter to the industry, the board says:

"In undertaking its study, the Federal Oil Conservation Board realizes the many-sided character of the problem before it. Not only the broad economic and legal phases of the question must be considered, but the engineering side of the oil industry demands attention if the subject is to be adequately covered.

"There are technical problems connected with the discovery of the oil, with the recovery of oil from the deep sands, with the transportation and refining of the crude oil, and finally with the efficient utilization of all of the products. In order to assemble the ideas of men in the industry who have been studying one or several of these problems, letters are being addressed to them asking for their opinions on certain phases of the situation. The information thus obtained may form the basis for conferences later.

"(1) With this brief expression of the board's purpose before you we would appreciate your views on some of the fundamental problems relating to the transportation of crude oil. For instance, it is generally recognized that there is a certain loss of oil between the gauge tank and the refinery. This may be due to

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Engineers Criticize Doherty Proposal

Decline to Appoint Committee to Consider It. Messrs. Fohs, Ball, de Golyer and Arnold in Debate. G. O. Smith Explains Oil Board Purpose

By L. M. Fanning

That the oil technologists comprising the petroleum section of the American Institute of Mining and Metallurgical Engineers should as individuals and through their company connections cooperate with the Federal Oil Conservation Board was the sense of the meeting held in New York. A motion made by Ralph Arnold, of California, that the section appoint a committee to consider the Doherty unit plan of production and formulate a program of cooperation with the Federal board was defeated after Max Ball, of Denver, and E. de Golyer, retiring chairman, pointed out that the petroleum section was primarily a forum for the exchange of ideas, that funds were not available for such an investigation and that the work would be duplicating that being carried on by other agencies such as the American Petroleum Institute.

Dr. George Otis Smith, director of the United States Geological Survey, chairman of the President's commission on Naval reserves and an adviser to the Federal Oil Conservation Board, outlined the aims of the latter body. He said it was reasonable to assume the President had been motivated in appointing the board by a feeling of his responsibility.

Oil Board's Purpose

"I have frequently been asked what the board intended to do; what it is going to prove," Doctor Smith said. "I think I can speak as knowing the board and I can say that it does not intend to prove anything; its desire is to improve something and to take national regard to the improvement of one of our most important resources, petroleum. The board members, already burdened with responsibilities, must necessarily call upon people of authority—you people—for assistance. I think the questionnaires sent out show distinctly that the discussion is not limited to any one line; that it is meant to be general and complete.

"Despite reports to the contrary there are some of us in Washington who believe we have to go outside of Washington for information, and that is why the board is asking the aid of responsible members of the petroleum industry. The board's desire is to improve conditions.

"The Government realizes its responsibilities in connection with Government land and land held in trust. It has been out of line with the ideas of some in Washington for a long time that Indian lands should be auctioned off regularly without regard to conditions in the petroleum industry. Yet certain laws made this mandatory and the Government has had no choice. It has also been suggested that it has been unwise to open the Naval reserves to exploitation at times said to be unfavorable for production; this is debatable, but the point is that the Government realizes its responsibilities. Sometimes there is more responsibility than authority, the usual case as regards the executive offices of the Government.

"There has been some discussion as to what constitutes waste. Definition of waste is difficult. We do not all define it the same. But I believe there is a general consciousness that all is not well in the industry. I hope you are regarding this investigation in the spirit in which it is being conducted; that you regard it as a scientific and economic basis of investigation rather than one associated with men with more political sense than economic sense."

Mr. Arnold in discussing Mr. Doherty's plan said the methods proposed were revolutionary, but that we have obtained many good things in this country through revolution. He recalled that during the war one of the principal problems encountered in relation to taxation was computing depletion; that through cooperation of leading geologists and technologists a method was arrived at which was opposed at first by the Treasury Department and by the principal oil companies as revolutionary, but which was adopted and proved satisfactory. He stated that he believed problems should be worked out without legislation if possible but through cooperation. If supplemental legislation is needed let it come from the industry.

F. Julius Fohs' View

F. Julius Fohs said the appointment of the Federal board and the Doherty proposals should prove of benefit to the industry as a whole in that they are bringing about a concentration of minds upon effective means of solving the problems. Regarding the Doherty plan, he said it meant a change in a great many basic laws and he believed it would be impractical to get it in operation quickly enough to accomplish its objects. He felt that other steps should be taken looking to more prompt correction of some of the difficulties.

One of the first things should be the determination of what our reserves are, and he suggested a cooperative study by the Government and the industry making use of every available resources from the standpoint of present knowledge and taking into consideration every factor, such as improved methods, price, mining sands and shale development. He suggested exploration without including exploitation; that is, some method of determining reserves in advance of pumping. He thought the taking of cores would be helpful in determining the value of our deposits without actually exploiting the areas tested. The cost involved might be argued against this plan, he said, but under present methods capital is necessary and becomes tied up immediately after discovery in additional drilling for protection, while prior testing would bring about a better method of developing parcels so tested with resultant saving of unnecessary drilling.

He agreed with Mr. Doherty that it is not right that a small holder can force the development of a pool. He said when the Boyd Oil Co. brought in the discovery well at Wortham it made an active effort to effect curtailment with other holders because of market conditions. One well started on 17½ acres and two others started on smaller acreage forced the larger holders to develop immediately. The result was that the advances in the price of crude oil were deferred for three months.

Just what the unit area should be could only be determined after careful consideration, he said. Mr. Fohs believed by agreement of operators and after education with respect to reserves and improved methods future pool development would be on a more scientific and economic basis. He said the Government could help by restricting operations on its so-called reserves when the oil is not needed, and also in the matter of diplomacy in encouraging American development in foreign fields.

That it would be impossible to bring about the unit plan of operation without the Government owning the subsoil, that a constitutional amendment as impractical and unpopular as the eighteenth amendment would be involved and that there has been no overproduction or waste and drilling should be permitted to go on unrestricted, were comments made by Eugene Coste. He also stated that the reason estimates of reserves had fallen down was that knowledge required of the origin of oil is lacking.

Max Ball's Opinion

Mr. Ball said that while recognizing the evils of small acreage in production and its effects on development, he saw practical difficulties in the operation of the Doherty plan. As he saw it the plan would benefit large unit operation and prevent waste occasioned by small fraction production. He saw a difficulty in the first step of Mr. Doherty's plan, namely, the granting of a permit.

This would put in the hands of a public servant at Washington the matter of determining whether or not a new pool should be opened. The public is not interested in whether the oil companies are making money, Mr. Ball said, and if a man sat in Washington and said, in effect, that he would not grant a permit because prices were so low that the oil companies could not make any money, he would lay himself open to violent attack and be in an untenable position. He could not help but be influenced by public sentiment, and so the plan might fail in its first step.

Mr. de Golyer said the impressions he had gained of the Doherty plan by a first reading of it were that it was something entirely new and a radical departure from existing methods. He said he was willing to grant the desirability of unit operation on the part of a company which found a pool but he was inclined to believe that it might be hard on the smaller companies without the financial resources of the larger ones to get any share of the development.

He questioned its practicability from the standpoint of development under political auspices. He doubted whether the plan would result in getting more oil out of the ground. It would conserve a lot of gas and would tend to stabilize production so that it would not be subject to such wide fluctuation, but Mr. de Golyer believed any attempt to switch over from present methods, to swap horses while crossing the stream, would make poor fluctuations look mild.

E. de Golyer's Criticism

Mr. de Golyer pointed out that several pools had been developed as a unit in this country and elsewhere. In Mexico he said the Potrero del Llano Field was a unit development, the territory being fully protected, and he believed it did not produce as much oil proportionately as the Casiano Field which was competitively developed. He doubted whether as much oil in barrels would be recovered from the sand in the case of one company developing the pool as under the competitive system.

The method of bringing about the unit plan, as suggested by Mr. Doherty, did not seem feasible to Mr. de Golyer. He said anyone familiar with world conditions and the handling of Government concessions would be surprised and shocked at the absence of times when the Government contracted directly with the

(Continued on Page 211)

CRUDE OIL PRODUCERS RECEIVING MILLION DAILY MORE FOR PRODUCT

While crude petroleum price increases are looked upon generally as harbingers of prosperity for the petroleum industry, few persons, even including those connected with the industry, realize the full extent of the meaning of an advance in the price of crude to the oil business. But, when it is considered that each crude price increase automatically raises the value of all crude oil held in storage and that it immediately affects the daily income of producers of hundreds of thousands of barrels of oil, some conception can be gained of its importance. For instance, a general price advance of 10 cents a barrel for crude would increase the oil held in storage $39,000,000 and add $192,000 every day to the income of producers.

Crude price increases announced since the first of this year have added approximately $238,757,654 to the value of crude oil held in storage in pipe lines, tank farms and refineries throughout the United States and crude oil producers now are receiving about $1,100,991 every day more for their crude than they would have recieved with the same production on January 1.

Just what the price increases since the first of this year mean to owners and producers of crude in various sections of the United States, is shown by the following tables:

Increased Value Stored Oil

Eastern	$ 24,508,971
Okla., Kansas, Texas	126,756,984
Louisiana-Arkansas	22,784,580
Gulf Coast	13,173,454
Rocky Mountain	23,472,132
California	28,061,533
Total	$238,757,654

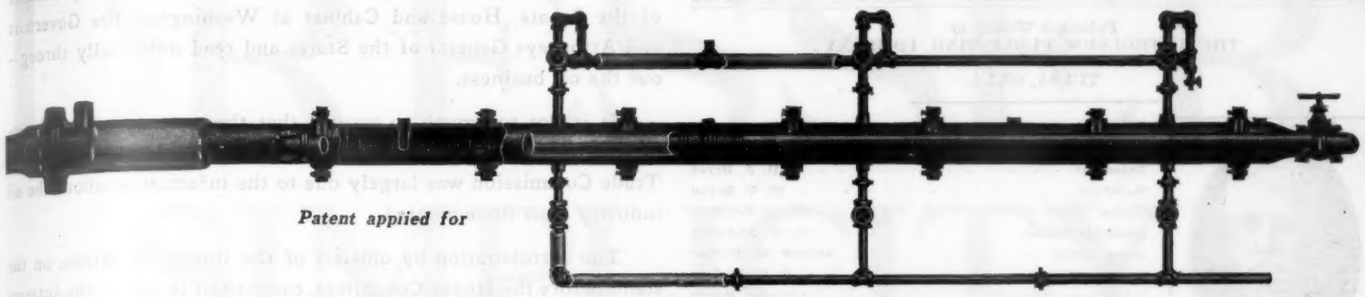
Increased Daily Income Producers

Eastern	$ 74,010
Okla., Kansas, Texas	608,891
Louisiana-Arkansas	92,951
Gulf Coast, S.W. Texas	59,235
Rocky Mountain	64,284
California	201,620
Total	$1,100,991

Crude price increases, such as have been announced since the beginning of this year, mean more than the distribution of more than $1,000,000 daily additional to producers and $238,000,000 more to owners of stored oil. The higher prices result in millions of dollars additional being attracted to new development work and to operations in older producing fields where low prices for crude made such operations unprofitable. Wildcat operations are the most costly of oil field development because such operations usually are far removed from sources of supply and the vast amount of material, equipment and machinery needed must be transported long distances because of the absence of supply stores. Consequently, it is only when prices of crude oil are high enough to justify these great expenses that wildcatting is carried on.

Higher prices aid development work in another way. Operators owing money to banks, with crude oil in storage as security, are enabled to procure additional funds to carry on operations because of the increased value of the security for these notes held by the banks.

When in less than two months time more than $200,000,000 is added to the value of the raw product of any industry and producers of this raw material are given more than $1,000,000 a day more for this product, that industry is bound to prosper. Such is the situation being enjoyed now by the oil business and various branches of industry associated with oil such as machinery manufacturers, pipe mills, oil field equipment makers, tool manufacturers, oil field specialty concerns, engine builders, derrick companies and the many other concerns manufacturing and distributing tools, equipment and other supplies needed in the oil business.



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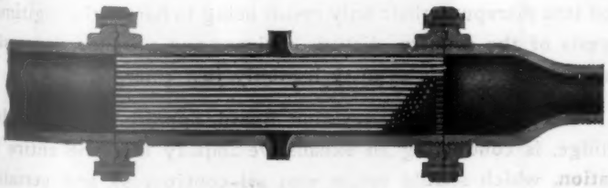
WORTHAM CRUDE. 41° Be. Gravity. 80% B. S. 5% Free Water content. 2,000 barrels per day. Average cost per barrel ½ cent.



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MEMBER AUDIT BUREAU OF CIRCULATIONS

HANDS OFF!

There have been 13 investigations of the oil industry by Washington in the past eight years, not to speak of the State and local investigations all over the country: legislative, judicial and executive.

As The Oil and Gas Journal has forecast the recent advances in the price of gasoline have started a new series of attacks on the industry in Congress and elsewhere. A House Committee at Washington already has been taking testimony and a proposal in the Senate for a renewed inquiry by the Federal Trade Commission has barely been averted.

The resolutions follow the familiar form, asserting that the price increases are unwarranted and that a monopoly exists.

The accompanying oratory is also of the usual type, fully anticipated and completely refuted in "The Oil Industry's Answer" published by The Oil and Gas Journal a year ago, and recently reprinted and placed in the hands of every member of Congress.

The officials from the United States Bureau of Mines summoned to testify before the House Committee restated the facts set out in that booklet, and in the Senate discussion the arguments which prevented the adoption of Senator Trammell's resolution were those used in "The Oil Industry's Answer."

The situation today is an identical parallel with that at the time "The Oil Industry's Answer" was compiled. Crude and gasoline prices were advancing in expectation of a decline in production and the politicians were preparing for their last year's crusade against the industry.

The facts and arguments then presented are just as timely today, as shown by their reiterance before Congress. In fact, there is no other or additional argument to offer, so thoroughly was the ground covered.

"The Oil Industry's Answer" has become, as it was intended, the text book of the industry, used in the preparation of arguments, addresses and advertising, placed on file in the libraries of universities, schools and newspapers, and in the hands of every member of the Senate, House and Cabinet at Washington, the Governors and Attorneys General of the States and read universally throughout the oil business.

It is not too much to assume that the attitude of the Senate in frustrating the proposed renewal of investigation by the Federal Trade Commission was largely due to the information about the oil industry thus disseminated.

The corroboration by officials of the Bureau of Mines, on the stand before the House Committee, cannot fail to add to the interest in the "Answer."

In contrast with the conditions at Washington before "The Oil Industry's Answer" was published, when any sort of assault on the industry was tolerated in Congress without a dissenting voice, Senators and members of the House, fortified with the facts about the oil business, are not now afraid to stand forth and challenge its assailants.

Nor are these limited to representatives of oil producing States. The Senators from Oklahoma and Kansas were supported vigorously by Senators from New York State and Maryland in bold opposition to the Trammel resolution.

The debate showed a realization that these attacks on the oil business were as useless and injurious as attacks on any of the other industries now under fire from discredited radicals.

Senator Curtis recounted the number of gasoline investigations that have already been held without a single constructive result, their sole effect having been to handicap industry.

The Department of Justice and the Federal Trade Commission, he reminded the Senate, have within the past two years conducted the most searching inquiries into the gasoline situation and all the evidence has long been in possession of the Attorney General of the United States. What need, therefore, for putting the industry to the labor and expense of going through all that again?

The LaFollette investigation, still fresh in the public mind, did its worst, but the only effect was the overwhelming defeat of its sponsor before the people.

The Congressional politicians who are starting this new gasoline hunt had better take to heart the blunt declaration of Senator Bruce of Maryland that prior investigations of that character had fallen into disrepute, their only result being to harass the legitimate interests of the country, disturb business and produce depression from which the whole country has only just emerged.

The Federal Oil Conservation Board, appointed by President Coolidge, is conducting an exhaustive inquiry into the entire oil situation, which should set at rest all controversy and certainly makes unnecessary any contemporary meddling and muddling by Congressional "probers."

The President's board consisting of four members of the Cabinet and a technical committee of Government officials, has the confidence of the public which cannot be said of any investigations begun and carried on by politicians for political effect.

While the President's board has the whole subject in hand the politicians in House and Senate should be ordered to keep hands off.

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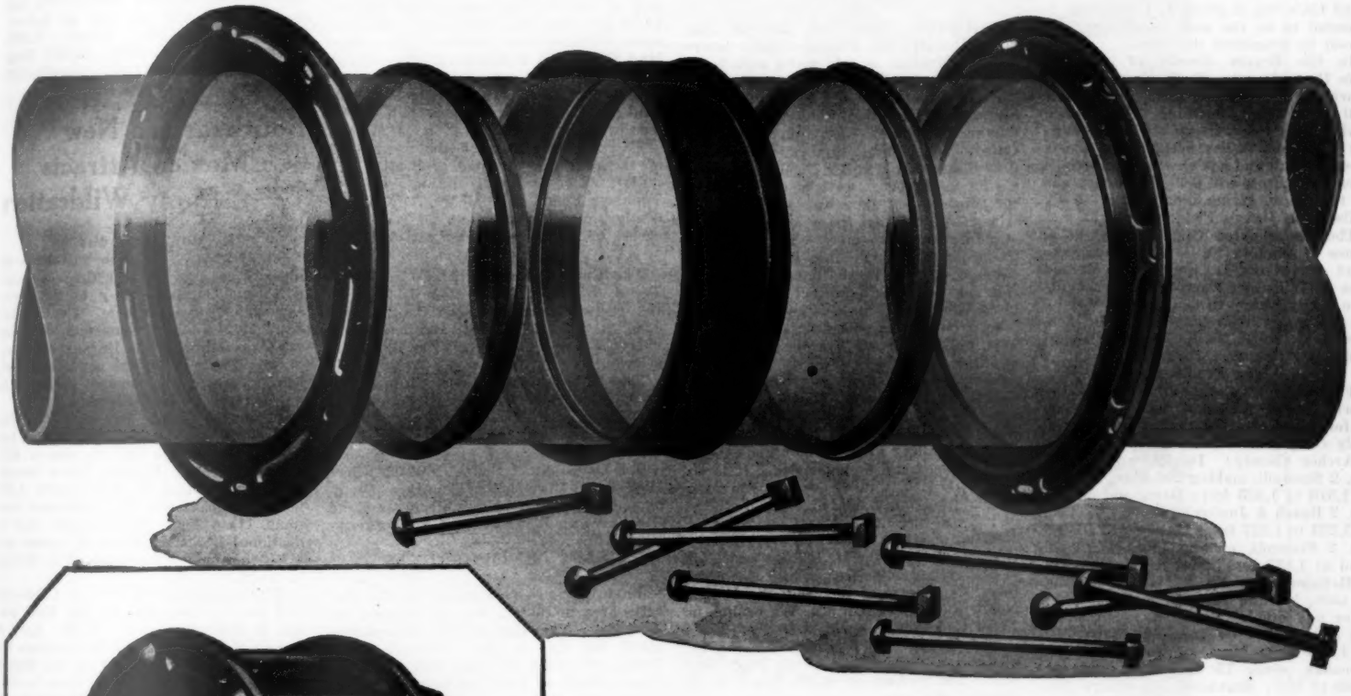

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Late News From the Fields

NORTH CENTRAL TEXAS

FORT WORTH, Tex., Feb. 24.—Indications point to a new discovery that may mean a new production area in Wilbarger County. The well of Levy and others, about 3 miles east of the producing area of the South Vernon Field, is showing for a producer. The well got sand at 1,430 feet and made one flow after which it filled up about 500 feet in oil. It looks as though it might be good for about 50 bbls. daily at its present depth.

There is another prospective producer in Wilbarger County, the Gulf Production Co.'s No. 1 Waggoner, 2 miles east of the Levy test. The Gulf well is reported making 8,000,000 feet of gas daily and showing a small amount of oil. Sand was found at 1,290 feet. An effort is being made to shut off the gas and test the oil possibilities.

In Reagan County the Texon Oil & Land Co.'s No. 4 group 1, University, is expected to be the next completion. It should be completed this week.

In the Brazos district of southern Palo Pinto County, F. H. Scott of Fort Worth is drilling at 2,040 feet. This well is making something of a record, having been under fire only 18 days. During that time it has been drilled to its present depth and has also set two strings of casing. Scott will drill two more wells on this lease, giving him a total of six wells in the Brazos Field.

The Consolidated Oil Co. (Knight & Hines of Wichita Falls) is preparing to start operations in the South Vernon area of Wilbarger County. It is moving in a heavy rotary to drill a deep test on the Waggoner land, east 80 acres of Section 4 H. & G. N. Railroad survey of Wilbarger County.

New Producers

Following is a list of wells in the North Texas territory that have come in for production but that have not been fully completed:

Archer County: Daniels and others' No. 2 Stampfli, making 200 bbls., in sand at 1,316 to 1,335 feet; Davis and others' No. 2 Roach & Junker, making 125 bbls., at 1,223 to 1,227 feet; Harris and others' No. 2 Stampfli, making 125 bbls., from sand at 1,335 to 1,366 feet; Humble Oil & Refining Co.'s No. 2 Hayter, making 25 bbls., in sand at 1,356 to 1,363 feet; Maer and others' No. 3 Monohan, making 200 bbls. daily from sand at 1,313 to 1,334 feet; same operators' No. 2-A Monohan, doing 75 bbls. from sand at 1,203-18 feet; Murchison and others' No. 17 Griffin making 75 bbls. from 18 feet of sand topped at 1,301 feet; Petroleum Producers' Co. No. 9 Hausler, making 200 bbls., in sand topped at 1,140 feet; Murchison and others' No. 16 Griffin, swabbing 100 bbls. at 1,316 feet; Phillips and others' No. 6 Wilson, swabbing 200 bbls. in 13 hours at 1,522 feet; Petroleum Producers Co.'s No. 11 Hausler, making 200 bbls. from sand at 1,129 to 1,146 feet; Shamrock Oil Co.'s No. 14-C Richardson, doing 125 bbls. from 11 feet of pay topped at 1,291 feet; The Texas Co.'s No. 1 Mineral fee making 100 bbls. from 8 feet of sand at a total depth of 1,374 feet; The Texas Co.'s No. 9-B Ragle, good for 50 bbls. at 1,075 to 1,086 feet; Wollett and others' No. 5 Griffin, making 60 bbls. from sand at 1,294 to 1,308 feet.

Wichita County: Adams and others' No. 2 Adams, good for 20 bbls. at 1,889 to 1,898 feet; Magnolia Petroleum Co.'s No. 113 Reilly, making 30 bbls. from sand at 1,517 to 1,522 feet; Texhoma & Cullum's No. 6-A Burnett reported making 105 bbls. from sand at 1,807 to 1,816 feet.

Wilbarger County: Kelp and others' No. 2 Waggoner, making 400 bbls. from 12 feet of sand at a total depth of 2,021 feet; Magnolia Petroleum Co.'s No. 66 fee, good for 120 bbls. from 10 feet of sand drilled into at 1,669 feet; Mutual Oil Co.'s No. 1 Zipperle, good for 90 bbls. at 1,308 to 1,333 feet; Ray and others' No. 6 Bond, making 150 bbls. at 1,990 to 2,030 feet; Petroleum Producers Co.'s No. 3 Dill, making 25 bbls. from sand at 1,823 to 1,831 feet; South Vernon Oil Co.'s No. 12 Stephens, making 320 bbls. at 1,267 to 1,305 feet; Wells and others' No. 3 Waggoner, good for 500 bbls. at 1,279 to 1,297 feet.

Young County: Monroe and others' No. 1 Ickert, good for 50 bbls. at 1,251 feet; Murchison and others' No. 6 Gambrell, making 200 bbls. from sand at 1,198 to 1,206 feet; No. 12 Gambrell, good for 150 bbls. at 1,206 to 1,210 feet; No. 3 Schlegel, making 75 bbls. at 1,198 to 1,207 feet; Simms Oil Co.'s No. 5 Carpenter, making 50 bbls. at 1,018 to 1,038 feet; The Texas Co.'s No. 3 Gambrell, making 965 bbls. from sand at 1,189 to 1,223 feet; No. 6 Gambrell good for 200 bbls. from 1,201 to 1,210 feet; Texhoma Oil & Refining Co.'s No. 2 Gambrell, making 200 bbls. at 1,229 feet and No. 3 Gambrell making 265 bbls. at 1,213 to 1,223 feet.

GULF COAST

HOUSTON, Tex., Feb. 24.—In Jim Hogg County, the Plateau-Wheat interests are drilling in two wells with locations made for 8 more on the Holbein. The Plateau-T. P. C. & Oil interests are completing three wells east of production. Buffam and others' No. 1 failed in the first sand and is being drilled deeper. The Big Bend Oil Co. set casing in No. 10. Derricks are standing for three more tests. Kisselman and St. Albans is drilling three with derricks standing for three more. The Magnolia Petroleum Co. is drilling Nos. 4 and 5 Thompson. O. W. Killiam is completing No. 3. The Texo Oil Co.'s No. 2 is drilling in and No. 3 is below 900 feet. The Witherspoon Oil Co. is drilling in two wells in the southwest corner of the Holbein ranch.

In Webb County, the Cin-Tex Oil Co. is spudded in No. 7 Los Ojulas and the Wheatly Oil Co.'s No. 14 is drilling in.

In the Luling Field Jarmon and others' No. 3 Moore is a 500-bbl. well. It is on the Caldwell County side. On the Guadalupe County side, Sights and others' No. 1 Spring, a wildcat, is reported showing at 2,080 feet. The Witherspoon Oil Co. abandoned No. 1 Ross, south of Lockhart, at 2,400 feet in the Edwards' lime. Northeast of the field, the United North and South Oil Co. set casing in No. 1 Callahan and will test.

The Humble Oil & Refining Co.'s No. 60 Smith in the Goose Creek Pool blew out while bailing at 4,200 feet. It is blowing dry gas.

OKLAHOMA

The Shaffer Oil & Refining Co.'s No. 1 Little, SW cor. NW NE, Section 10-10-8, in the Cromwell Field, was deepened three feet in the Wilcox sand, to a total depth of 3,134 feet without much result. There is about 2,500 feet of oil in the hole, and other operators are watching this well closely and will deepen their wells if the Shaffer well proves to be a producer. The Gypsy Oil Co.'s No. 6 Replogle, SW cor. SE NE, Section 9-10-8 which is drilling to the Wilcox, is now at 3,575 feet.

The Magnolia Petroleum Co.'s No. 1 Sukovaty, SW cor. NW NE, Section 3-14-5, in the Davenport district, Lincoln County, made 623 bbls. for the 24 hours ended Sunday morning and 462 bbls. the following 24 hours.

Killibrew & Moore's No. 1 Aldridge, NW cor. SW NW, Section 14-10-7, in Seminole County, had a small show of oil with no water in sand at 3,719-42 feet.

The Prairie Oil & Gas Co.'s No. 3, NE cor. SE, Section 35-9-9, in the Papoose Pool, was shut in for 28,000,000 feet of gas in sand at 3,336-53 feet.

The Burke-Greis Oil Co.'s No. 1, SW cor. SE SW, Section 1-13-7, Okfuskee County, had 1,600 feet of oil in the hole from sand at 3,568-74 feet, total depth 3,595 feet in shale.

The Southwestern Petroleum Co.'s No. 8 Thompson, NW cor. SE NW, Section 4-10-8, in the Cromwell Field, reached the top of the sand at 3,385 feet, and was pulling the big pipe.

The deep sand production in the Tonkawa Field, Kay and Noble Counties, dropped off to 70,977 bbls. for the 24 hours ended Tuesday morning, Feburary 24.

The Marland Oil Co.'s No. 2 Thomas, C SE SW SW, Section 15-25-2w, in Kay County, had a show of oil at 3,827 feet, and was getting ready to drill in.

The Marland Oil Co.'s No. 1 Fitzgerald, C SE SW NE, Section 1-26-2w, in the Hubbard Pool, Kay County, was making 750 bbls. of oil and cutting 10 per cent.

Acreage in the neighboorhood of the Hubbard Pool is being sold for high prices as is attested by the following transactions: Toumaniaz, of the O'Kansas Oil Co., paid $32,000 for 320 acres in the west half of Section 32-27-1w. The Twin State Oil Co. paid $10,000 for the north half of the northeast quarter Section 7-26-1w. T. C. Whalen paid $500 an acre for a half interest in the west half of the northwest quarter of Section 11-26-2w; the National Union Oil Co owns the other half interest. The Marland Oil Co. is reported to have offered $1,000 for the full seven-eights interest in this tract. The Magnolia Petroleum Co. paid $75 an acre for the west half of the northwest quarter of Section 11-26-2w.

T. B. Slick purchased the north half of the southeast quarter of Section 27-25-1w, which is north and west of the Tonkawa Field. The McMan Oil Co. recently brought in a well in the southwest corner of the same quarter section.

KANSAS

The Empire Gas & Fuel Co.'s No. 17 Teeter, SE cor. NE, Section 16-23-9, in the Teeter Pool, Greenwood County, had sand at 2,332-2,401 feet, and made 705 bbls. the first 24 hours after a 135-quart shot.

The Valerius Oil & Gas Co.'s No. 3 Oswald-Valerius, NW cor., Section 17-12-15w, Russell County, was swabbing 20 bbls. an hour from sand at 2,936-38 feet.

Joe Davis' No. 1 Smith, NW cor., Section 14-12-16w, Ellis County, had a showing for a 25-bbls. well in sand at 3,405-10 feet. The Oil is of 31.5 gravity.

EAST CENTRAL TEXAS

Important news came out of the Bazette area in eastern Navarro County on Tuesday. The test of the Humphreys Boyd Oil Co. on the Walthall farm found soft chalk at 2,137 feet and hard Austin chalk at 2,160 and was drilling at 2,320 feet, still in the chalk. As the Austin chalk was not expected by any geologists to be found higher than 2,100 feet, and by many at 2,300 feet, the Humphreys Boyd location appears to have been ideally made. News from the field Tuesday morning was to the effect that a much more hopeful feeling was prevalent among lease owners and it is even thought that the Atlantic Oil Producing Co. and Penn's test on the Upsher farm, north and west of the Humphreys Boyd test may make a well. The Atlantic & Penn test drilled to 2,945 feet without having found any sign of chalk, but it may have drilled through the fault and may find the Woodbine sand on the upthrow of the structure. Drilling was stopped at 2,945 feet and casing will be run to that depth.

In the Kosse area, Falls County, Harrison and others' test on the Preston farm was dry and abandoned at 3,917 feet.

Between Currie and Wortham, Bob Penn and others are believed to have a failure in their test which is below the level where Woodbine sand was expected.

Only 50 wells drilling in the Wortham Field at present will be completed. The Wortham, Currie, Powell and other East Central Texas producing areas are still very quiet. It is now all up to Bazette to supply a renewal of lively times in the field.

Recent completions in the Wortham Field, with initial production and total depth, were as follows. The Texas Co.'s No. 2 Chancellor, 300 bbls., 3,010 feet; Simms Oil Co.'s No. 3 Simmons A, 300 bbls., 2,983 feet; Simms Oil Co.'s No. 4 Simmons A, 275 bbls., 2,982 feet; Porter & Howell's No. 1 Sneed-Easterling, dry and abandoned at 3,125 feet; Humphreys Boyd Oil Co.'s No. 7 Ferguson, 360 bbls., 3,020 feet; Humphreys Boyd Oil Co.'s No. 12 Smith B, abandoned at 3,055 feet; Humphreys Boyd Oil Co.'s No. 13 Smith B, 300 bbls., 3,018 feet; Humphreys Boyd Oil Co.'s No. 6 Wilson A, 500 bbls., 3,020 feet; Humphreys Boyd Oil Co.'s No. 1 Wilson B, 300 bbls., 3,020 feet.

In Hunt County, the Gulf Production Co.'s No. 1 Alexander was abandoned as dry at 3,200 feet and the same company's No. 1 Bryan was abandoned at 3,300 feet.

In the Richland Field, Navarro County, John Hooser's No. 3 Swink, was dry and abandoned at 3,153 feet.

NORTH TEXAS PRODUCTION

FORT WORTH, Tex., Feb. 24.—The daily average estimated production of the field of North-Central Texas for the week ending February 21 was as follows: Burkburnett, 14,980; Electra, 17,080; Archer, 41,495; Stephens, 14,365; Ranger, 6,205; Reagan, 11,050; miscellaneous, 27,285; total, 132,460 bbls.

Southeastern New Mexico Attracts Many Wildcatters

By William M. McGinn

ARTESIA, N. M., Feb. 21.—From all indications a wildcat drilling campaign will soon be under way to the north, east and southeast of here. The fact that some of the larger companies, including the Ohio, Midwest and Roxana, are showing a preference for the southeast trend, has influenced the smaller operators to buy acreage in that direction.

A number of new locations have been made in both the proven and wildcat territory. The Ohio Oil Co. has a well drilling on the Francis Tracy permit, NW cor. Section 34-21-26, below 1,200 feet and has made two additional locations. One is on the Merchant tract in Section 1-19-28, southeast of Artesia and a location on the Ryan permit in Section 12-20-28.

The Standard Oil Co. of California will start a new hole on the Reiff permit in SW of Section 8-20-28. Long & Burch, Fort Worth and Breckenridge operators, will start a well on the Barker permit, consisting of 2,500 acres in Sections 13, 24, 25 and 26, Township 17, Range 29. Compton and others have made a location in the northwest quarter of Section 14-18-28. William Dooley has closed a contract to drill on the Rawson permit in Township 20-29. This location will probably be made in Section 11. The New State Oil Co. has made a location for No. 2 Roswell, which is 550 feet north of its No. 1 Roswell in Section 4-18-28. It is reported that the No. 1 well of this company will be given a second shot of 100 quarts to increase the production.

A location has been made on the Dunn permit in Section 10-17-28, which is southeast of the proven area. This well will be drilled by Illinois interests. Flynn-Welch & Yates made a location in the northwest quarter of Section 9-18-28, offsetting No. 1 Roswell.

Not satisfied with the showing obtained, Keys and others are now drilling their No. 1 deeper and have encountered a good gas and oil sand at 2,220 feet. This well is in the SE cor. SW NE of Section 19-18-28.

While most of the interest is centered in the territory east of the Pecos River, a number of operators are watching Oscar Howard's No. 1 Peckinpough in Section 2-19-26. Following a fishing job at 2,119 feet, the well stood over 100 feet in fluid, this coming from 19 feet of sand found at a depth of 1,145 feet. Should production not be obtained when a depth of 2,250 feet is reached, it is the intention of the owners to plug back and shoot the now producing sand.

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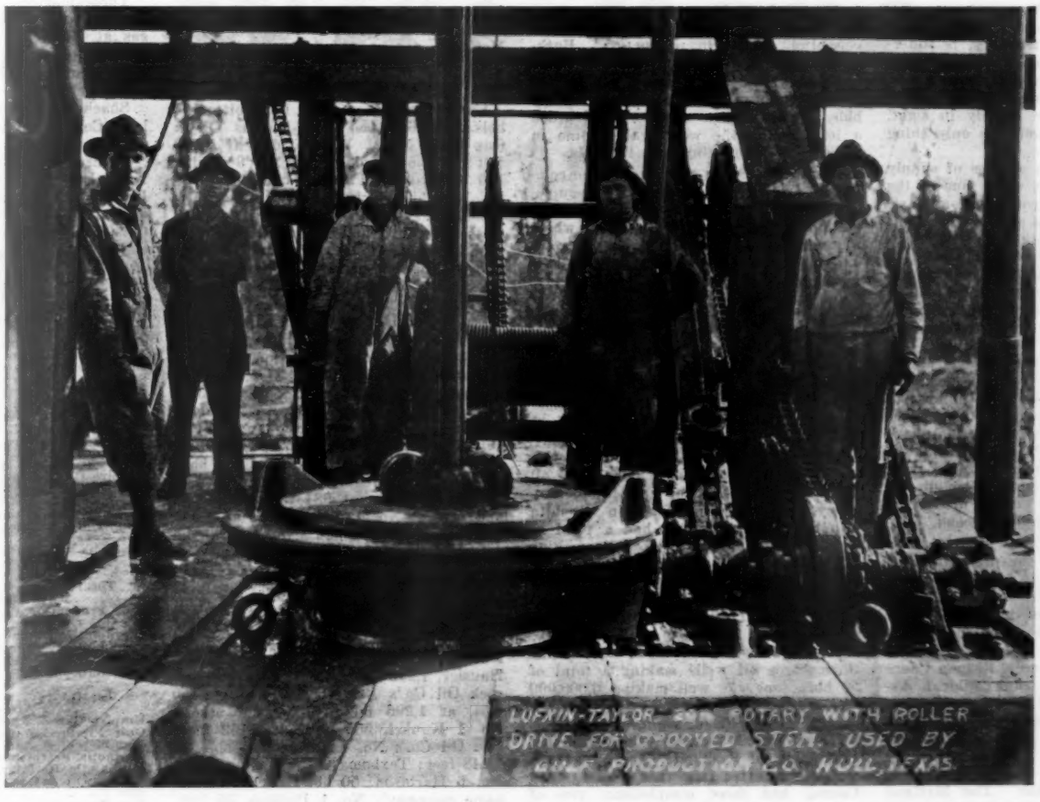

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North-Central Texas Field

By George R. Kelley

Completions for week more than double previous week. Water shortage hindering operations in South Archer and North Young Counties. Crosbie Oil Co.'s No. 1 Burnett, Carson County, made 50 bbls. an hour in first six hours. Mahlstedt Mook Co.'s No. 4 Newton, Brown County, making 300 bbls. initial.

FORT WORTH, Tex., Feb. 23.—The South Archer-North Young County district, by far the most active district in the North Texas oil territory, is suffering a serious water shortage which threatens to hinder developments unless there is an immediate remedy. And there is no immediate remedy in sight. Plentiful rains are about the only thing that can bring relief.

At present the main sources of supply are Lake Olney and a water line of the Gulf Production Co. from the company's Wilson reservoir to the north. The Gulf is running into the south end of the county between 10,000 and 12,000 bbls. of water daily and cannot meet the demands. In addition to this supply a train load of water is hauled into the field every morning from a water source at Seymour in Baylor County.

In the face of this very serious handicap the South Archer-North Young area leads all other districts in the number of new locations. During the past three weeks a total of 305 new locations have been made in the North and West Texas territory. By far the majority of these have been in the district under discussion, with the South Vernon district in Wilbarger County running second.

Higher Prices Cause Activity

Recent advances in the price of crude oil no doubt are responsible for the vast amount of activity that is getting under way in all sections of north and west Texas. Activity is confined to no particular section of the territory, for they are playing the Panhandle, Reagan County, Crockett County, rank wildcat districts and the older oil producing counties like Eastland, Stephens and Shackelford.

In Reagan County arrangements are being made for caring for a large amount of production that is expected to be developed there this year. The Marland interests have already completed the construction of six 80,000-bbl. steel tanks in Reagan County, have foundations for four more and are grading for four additional tanks of the same size, giving in all a total of fourteen 80's either finished or under process of construction.

Late reports are to the effect that the Humble Pipe Line Co. has adjusted matters with some of the land owners that for a short time held up work on the laying of its lines from Big Lake to San Angelo. There is a gap of only about 20 miles now to be completed, and about 12 miles of this gap has the pipe already strung. It is now generally believed that the middle of March, or probably an earlier date will find the Humble line ready to run oil from Big Lake Field to San Angelo, where the rail facilities for the shipment of crude are far superior to those at Big Lake.

Production Shows Gain

Production in the North Texas territory last week showed a good gain over the daily average of a week ago. The total for the week ending last Thursday was 134,345 bbls. as compared with a total the previous week of 130,980 bbls. This gives a gain for the week of 3,365 bbls. in average daily runs. It is worth while to mention that the only gain anywhere in the territory last week came from the Archer County Fields. Archer County's daily production was 43,350 bbls. as against a daily total the previous week of 37,430 bbls. This is a gain for the county of 5,920 bbls.

Every other pool in the territory recorded a decline in production. Burkburnett lost 95 bbls., Electra lost 610 bbls., Stephens County lost 305 bbls. and Eastland County had a decrease of 90 bbls. The wildcat pools also recorded a loss during the week, the decline in these pools amounting to 1,450 bbls.

Last week also set a good record for completions, more than doubling the completions of the previous week. Total completions for last week were 90, of which number 51 were oil wells, three were gas well and 36 were dry holes. This compares with 43 completions the previous week, 25 of which were producers and 18 were dry holes, there being no gas wells reported for that period. New production last week totaled 6,685 bbls. as against new production the week before of 5,080 bbls.

Archer County completed 29 wells last week, 18 of which were oil wells and 11 were dry holes. New production amounted to 3,760 bbls. Wichita County had 23 completions, 13 of which were oil wells with 400 bbls. of new production. There were 10 dry holes in Wichita County. Young County had a total of seven completions, four oil wells making 590 bbls. of flush and three dry holes. Stephens County reported five completions, one a dry hole and four producers making a total of 140 bbls. of new production.

Eastland County recorded six completions, three oil wells making a total of 50 bbls., one gas well making 6,000,000 feet of gas daily and two dry holes. Wilbarger County had eight completions, seven of which were producers making 1,695 bbls. of flush oil. There was one dry hole reported from that county. Clay County had three completions, two of which were dry holes and one a gas well making 1,500,000 feet of gas. Brown County reported one completion, a producer making 20 bbls. Reagan County reported the completion of three dry holes. In the wildcat areas there were a total of five completions, one producer making 30 bbls., a gas well making 1,000,000 feet of gas and one dry hole.

Wichita County Completions

Honey and others' No. 1 Brunson, dry at 875 feet; Franklin and others' No. 1 Evert, dry at 1,241 feet; Magnolia Petroleum Co.'s No. 109 Reilly, dry at 1,680 feet; same company's No. 112 Reilly, 25 bbls. at 1,295 feet; Ascot Co.'s No. 26 Roller, dry at 2,000 feet; Hammon and others' No. 2 McCarty, 10 bbls. at 490 feet; same company's No. 3 McCarty, 10 bbls. at 491 feet; same company's No. 4 McCarty, 10 bbls. at 495 feet; same company's No. 5 McCarty, 10 bbls. at 493 feet; same company's No. 6 McCarty, 10 bbls. at 493 feet; same company's No. 1-A McCarty, 20 bbls. at 1,610 feet; Hawkins and others' No. 3 Watkins, 100 bbls. at 1,765 feet; Hughes and others' No. 1 Ferguson, dry at 1,850 feet; Gulf Production Co.'s No. 6 Waggoner, dry at 2,035 feet; Maer and others' No. 1 Allen and Kemp, 25 bbls. at 1,652 feet; Magnolia Petroleum Co.'s No. 66 Honaker, 20 bbls. at 1,458 feet; same company's No. 10 Maer, 130 bbls. at 1,762 feet; Moore and others' No. 2 Burnett, 15 bbls. at 1,589 feet; Shappell Oil Co.'s No. 1 McCarty, 15 bbls. at 492 feet; same company's No. 2 McCarty, dry at 683 feet; Shaw and others' No. 1 McCarty, dry at 495 feet; Wichtex Oil Co.'s No. 2 McFall, dry at 543 feet.

Archer County Completions

Carter and others' No. 19 White, 115 bbls. at 1,602 feet; Mid-Kansas Oil & Gas Co.'s No. 1 Wilson, dry at 1,703 feet; Stidham and others' No. 8 White, 100 bbls. at 1,611 feet; same company's No. 15 White, 75 bbls. at 1,611 feet; The Texas Co.'s No. 1 Jackson, dry at 1,858 feet; Verschoyle and others' No. 9-B Wilson, 35 bbls. at 1,396 feet; Clark and others' No. 1 Rogers, dry at 1,388 feet; Harris and others' No. 1 Brown, 20 bbls. at 1,385 feet; Humble Oil & Refining Co.'s No. 3 Hayter, dry at 1,354 feet; same company's No. 1 Stamfil, 150 bbls. at 1,365 feet; Gulf Production Co.'s No. 1 Kunkel, 585 bbls. at 1,159 feet; same company's No. 4 Monohan, dry at 1,462 feet; same company's No. 5 Monohan, dry at 1,452 feet; same company's No. 9 Oil Investment Co., 80 bbls. at 1,107 feet; same company's No. 1 Stamfil, 250 bbls. at 1,346 feet; Jeffers and others' No. 2 Andrews, 5 bbls. at 984 feet; Litchfield and others' No. 1 Young, dry at 1,475 feet; Maer and others' No. 1 Graham, dry at 1,500 feet; McNamara Brothers' No. 1 Justice, dry at 1,800 feet; Moran and others' No. 1 Farmer, dry at 1,353 feet; Murchison and others' No. 15 Griffin, 200 bbls. at 1,305 feet; same company's No. 7-C Harmel, 75 bbls. at 1,280 feet; Petroleum Production Co.'s No. 8 Hausler, 1,210 bbls. at 1,144 feet; Shamrock Oil Co.'s No. 6-C Richardson, 150 bbls. at 1,296 feet; Shaw and others' No. 1 Kunkel, 585 bbls. at 1,152 feet; Sun Oil Co.'s No. 7 Farmer, 25 bbls. at 1,448 feet; Texhoma Oil & Refining Co.'s No. 6 Harbison, 50 bbls. at 1,351 feet; same company's No. 1 Phillips, 50 bbls. at 1,172 feet; Young and others' No. 1 Lasater, dry at 1,500 feet.

Young County Completions

Burns and others' No. 1 Tucker, dry at 1,508 feet; Dunn and others' No. 1 Johnson, 20 bbls. at 4,390 feet; Murchison and others' No. 8 Gambrell, 150 bbls. at 1,223 feet; same company's No. 2 Schegel, 160 bbls. at 1,205 feet; Gulf Production Co.'s No. 1 Schegel, 260 bbls. at 1,199 feet; same company's No. 7 Siegel, dry at 1,656 feet; Wilson and others' No. 1 Campbell, dry at 1,212 feet.

Stephens County Completions

Prairie Oil & Gas Co.'s No. 15 Atkins, 5 bbls. at 3,263 feet; same company's No. 2 Caldwell, dry at 3,288 feet; Pearson and others' No. 3 Williams, 50 bbls. at 2,129 feet; Sindorf Brothers' No. 3 Sorgee, 25 bbls. at 1,880 feet; Thompson and others' No. 2 Williams, 60 bbls. at 2,175 feet.

Eastland County Completions

Brothers and others' No. 1 Norton, dry at 1,843 feet; Dyer Brothers' No. 1 Norton, dry at 1,845 feet; Eby and others' No. 6 Miller, 5 bbls. at 1,663 feet; Magnolia Petroleum Co.'s No. 2 Gulf Carruth, 5 bbls. at 2,875 feet; Teatsworth and others' No. 3 Scott, 40 bbls. at 1,494 feet; Burkett and others' No. 1 Stanton, 6,000,000 feet of gas at 3,180 feet.

Wilbarger County Completions

Bridwell and others' No. 5 Dill, 155 bbls. at 2,025 feet; same company's No. 4 Dill, 185 bbls. at 2,054 feet; McCamey and others' No. 3 Stephens, 575 bbls. at 1,317 feet; Oxford Oil Co.'s No. 1 Waggoner, 145 bbls. at 2,070 feet; South Vernon Oil Co.'s No. 10 Stephens, 295 bbls. at 2,045 feet; same company's No. 11 Stephens, 300 bbls. at 2,051 feet; Waggoner and others' No. 1 Bond, dry at 2,603 feet.

Brown County Completions

New Era Oil Syndicate's No. 3 Prather, 20 bbls. at 1,317 feet.

Reagan County Completions

Brandon and others' No. 1 University, dry at 3,219 feet; Mid-Kansas Oil & Gas Co.'s No. 1 Hughes, dry at 3,397 feet; Texon Oil & Land Co.'s No. 1 Group 2, dry at 6,000 feet.

Wildcat Completions

Clay County—Lone Star Gas Co.'s No. 46 Byers, dry at 1,848 feet; same company's No. 21 Martin, 500,000 feet of gas at 1,741 feet; same company's No. 10 Stine, dry at 1,741 feet.

Throckmorton County—Larkin and others' No. 2 Richards, 1,000,000 feet of gas at 790 feet; McKnight and others' No. 1 Holley, dry at 1,510 feet; Plains Production Co.'s No. 1 McElroy, dry at 1,515 feet.

Shackelford County—Phillips Petroleum Co.'s No. 3 Lynch, 30 bbls. at 3,394 feet.

Johnson County—Brandon and others' No. 1 University, dry at 3,219 feet; Mid-Kansas Oil & Gas Co.'s No. 1 Hughes, dry at 3,397 feet; Texon Oil & Land Co.'s No. 1 Group 2, dry at 6,000 feet.

PRODUCTION REPORT

Week Ending February 19, 1923

Burkburnett	
Barkley & Meadows	540
Gulf Production Co.	690
Humble Oil & Ref. Co.	425
Magnolia Petroleum Co.	2,700
Panhandle Refining Co.	360
Prairie Oil & Gas Co.	30
Sinclair Oil & Gas Co.	75
Sun Co.	160
The Texas Co.	510
Texhoma Oil & Ref. Co.	375
Miscellaneous	8,730
Total	14,505
Electra	
Empire Gas & Fuel Co.	1,075
Gulf Production Co.	950
Humble Oil & Ref. Co.	135
Magnolia Petroleum Co.	4,200
Panhandle Refining Co.	65
The Texas Co.	3,710
Texhoma Oil & Ref. Co.	1,660
Miscellaneous	4,710
Total	16,505
Iowa Park	
Gulf Production Co.	40
Humble Oil & Ref. Co.	15
Magnolia Petroleum Co.	440
Panhandle Refining Co.	60
Texhoma Oil & Ref. Co.	35
Miscellaneous	3,100
Total	3,690
Archer County	
Empire Gas & Fuel Co.	595
Gulf Production Co.	3,460
Humble Oil & Ref. Co.	235
Magnolia Petroleum Co.	645
Panhandle Refining Co.	300
Prairie Oil & Gas Co.	1,145
Sun Co.	485
The Texas Co.	2,795
Texhoma Oil & Ref. Co.	2,735
Miscellaneous	30,955
Total	43,550
Petrolia	
Gulf Production Co.	80
Magnolia Petroleum Co.	15
The Texas Co.	70
Miscellaneous	260
Total	425
Stephens County	
Empire Gas & Fuel Co.	80
Gulf Production Co.	1,265
Humble Oil & Ref. Co.	865
Magnolia Petroleum Co.	690
Mid-Kansas Oil & Gas Co.	1,845
Prairie Oil & Gas Co.	595
Sinclair Oil & Gas Co.	105
Sun Co.	230
The Texas Co.	1,615
Texas Pacific Coal & Oil Co.	920
Miscellaneous	6,595
Total	15,155
Eastland County	
Gulf Production Co.	355
Humble Oil & Ref. Co.	55
Magnolia Petroleum Co.	635
Mid-Kansas Oil & Gas Co.	165
Panhandle Refining Co.	300
Prairie Oil & Gas Co.	505
Sinclair Oil & Gas Co.	365
The Texas Co.	260
Texas Pacific Coal & Oil Co.	810
Miscellaneous	3,215
Total	6,665
Strawn	
Texas Pacific Coal & Oil Co.	255
Miscellaneous	480
Total	735
Moran	
Empire Gas & Fuel Co.	40
The Texas Co.	130
Texhoma Oil & Ref. Co.	130
Miscellaneous	2,695
Total	2,995
Eastland-Comanche	
Humble Oil & Ref. Co.	190
Magnolia Petroleum Co.	1,235

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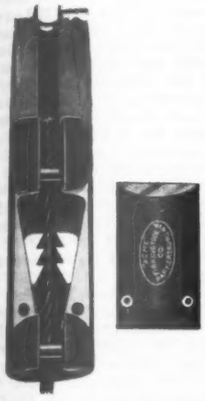

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Mid-Kansas Oil & Gas Co.	235	
Prairie Oil & Gas Co.	95	
Sinclair Oil & Gas Co.	30	
The Texas Co.	175	
Texas Pacific Coal & Oil Co.	125	
Miscellaneous	1,925	
Total		4,000
Young County		
Gulf Production Co.	215	
Panhandle Refining Co.	180	
Prairie Oil & Gas Co.	10	
Sinclair Oil & Gas Co.	410	
The Texas Co.	190	
Miscellaneous	3,130	
Total		4,135
Miscellaneous Districts		
Wilbarger County	4,470	
Montague County	80	
Jack County	25	
Brown County	925	
Coleman County	70	
Callahan County	2,320	
Mitchell County	1,545	
Reagan County	10,725	
Scurry County	45	
Carson County	1,830	
Hutchinson County	220	
Wheeler County	500	
Total		22,755
Total this week		134,345
Total last week		130,980
Gain		3,365

Two Panhandle Wells

In Carson County in the Texas Panhandle there are two additional wells showing for production. One is the Crosbie Oil Co.'s No. 1 Burnett which is producing from a depth of 2,830 feet. On first test the well made about 50 bbls. an hour for the first six hours. It is also showing for something like 1,500,000 feet of gas daily. The other is The Texas Co.'s No. 1 Burnett, which has reached the granite wash formation at 3,060-3,064 feet and has about 1,500 feet of fluid in the hole, latest reports say. The hole is caving badly.

In Brown County, the Mahlstedt Mook Oil Co.'s No. 4 Newton is on sand at 1,277 to 1,284 feet and is producing initially at the rate of 300 bbls. daily. This is in the northern part of Brown County west of Cross Cut and is one of the best producers ever drilled in that section of Brown County.

Two fair-sized gassers are reported from the Eastland-Stephens territory, one in Eastland and one in Stephens County. The Tidal Osage Oil Co.'s No. 1 Owne, in Eastland County, is reported making 21,000,000 feet of gas daily from the pay at 3,262 to 3,279 feet. In Stephens County the No. 1 Curry of Scott and Bateman is making 15,000,000 feet of gas at 3,090 to 3,120 feet in the lime formation.

Ed Parsons and others are starting two new wells in Eastland County, in the prospective area between Ranger on the north and Desdemona on the south. Both of the wells will be spudded in this week. Their No. 1 Jones is located in the Thomas A. Howell survey a quarter of a mile southwest of the same company's No. 1 Motes which is making 15,000,000 feet of gas daily from a depth of 3,100 feet. Their No. 2 Motes is another well to be started at once. It is located a quarter of a mile southeast of the No. 1 Motes, a gas producer.

Archer County Drilling

Shappell Oil Co.'s No. 16 Jackson setting casing at 1,795 feet; Texhoma Oil & Refining Co.'s No. 1 Chilson, preparing to swab at 1,810 feet; Wolfe and others No. 2 Chilson, drilling at 600 feet; Atlantic Oil & Producing Co.'s No. 1 Wilson, 1,541 feet; Carter and others' No. 20-E White, at 1,560 feet; Carter and Reese's No. 1 Wilson, at 300 feet; Forgy and others' No. 1 Pearston, at 1,175 feet; Hobbs and others' No. 5 Wilson, at 1,380 feet; Howell and others' No. 1 Wilson, at 1,210 feet; Knox and others' No. 1 Wilson, at 1,630 feet; Lincoln and others' No. 3 Oil Investment Co., cleaning out at 1,113 feet; Oil Investment Co.'s No. 6 fee, to pump; Phillips and others' No. 7 Wilson, underreaming; No. 8 Wilson, drilling at 675 feet; No. 9 Wilson at 1,345 feet; No. 10 Wilson at 1,105 feet; Prairie Oil & Gas Co.'s No. 31-D Wilson cementing casing at 1,540 feet; No. 32 Wilson, underreaming; Simms Oil Co.'s No. 6 Parrish, fishing at 1,400 feet; Staley and others' No. 9-C Wilson, drilling at 1,355 feet; Stidham and others' No. 13 White, at 1,570 feet; Young and others' No. 1 Matthews, at 260 feet; Archer Oil Co.'s No. 1 Coffield, at 1,235 feet; Dee Brothers' No. 1 Sadon, at 1,030 feet; Magnolia Petroleum Co.'s No. 1 Lauster, at 1,580 feet; Mitcham and others' No. 1 Wilson, at 800 feet. Norday Oil Co.'s No. 1 Anderson, at 500 feet; Southern Exploration Oil Co.'s No. 1 Pace, underreaming; Sun Oil Co.'s No 8 Farmer, underreaming; Atlantic Oil & Production Co.'s No. 1 Hayter, drilling at 240 feet; Bridwell and others' No. 1 Boren, preparing to pump at 1,100 feet; Blark and others' No. 4 Echols, setting casing at 1,314 feet; No. 6 Echols, drilling at 1,030 feet; Cook and others' No. 1 Campbell, at 620 feet; Croslin and others' No. 1 Garvey, at 1,100 feet; Daniels and others' No. 3 Stampfli, at 680 feet; Davis and others' No. 2 Roach & Junker, preparing to pump; No. 3 Roach and Junker, at 1,025 feet; Foster and others' No. 1 Andrews, at 430 feet; Grisham and others' No. 2 Hayter, at 1,060 feet; No. 3 Hayter, at 200 feet; Gwynne and others' No. 1 Scruggs, at 250 feet; No. 3-B Rogers, at 1,117 feet; No. 2 J. F. Rogers, at 1,000 feet; Hardesty and others' No. 1 Kunkel, drilling an oil sand at 1,190 feet; Harris and others' No. 2 Stampfli, preparing to pump; No. 3 Stampfli, drilling at 670 feet; Humble Oil & Refining Co.'s No. 2 Hausler, on sand at 1,104 feet; No. 1 Hayter, bailing at 1,359 feet; No. 2 Hayter, on sand at 1,365 feet; No. 4 Hayter, at 1,210 feet; No. 5 Hayter, at 1,126 feet; No. 3 Stampfli, at 320 feet; No. 4 Stampfli, at 460 feet; Jones and others' No. 1 Cernosek, fishing at 1,052 feet; Maer and others' No. 4 Monohan, drilling at 400 feet; No. 2-A Monohan, preparing to pump; Magnolia Petroleum Co.'s No. 1 Rogers, fishing at 1,209 feet; No. 1 Stampfli, drilling at 1,430 feet; No. 2 Stampfli, at 360 feet; Marland Oil Co.'s No. 1 Ward, at 200 feet; McGee and others' No. 1 Richardson, 200 feet; Murchison and others' No. 8-C Harmel, at 600 feet; No. 1 Hayter, at 1,160 feet; Mutual Oil Co.'s No. 1 Harmel, at 200 feet; Nicholson and others' No. 1 Prideaux, on sand at 697 feet; O'Donohoe and others' No. 1 Kunkel, at 930 feet; Ray and others' No. 14, on sand at 1,163 feet; Roxana Petroleum Corp.'s No. 3 Kunkel, preparing to complete; No. 6 Kunkel, being put on pump at 1,162 feet; Shamrock Oil Co.'s No. 7-C Richardson, at 950 feet; No. 12-C Richardson, at 1,210 feet; Shaw and others' No. 2-A Hayter, at 930 feet; No. 3-A Hayter at 1,025 feet; No. 4-A Hayter at 1,140 feet; Shaw and others' No. 6 Hausler, on sand at 1,156 feet; No. 7 Hausler, setting casing at 1,132 feet; No. 2 Kunkel, at 820 feet; Sun Oil Co.'s No. 6 Davis, at 890 feet; No. 2 Kunkel, at 1,020 feet; Superior Oil Co.'s No. 1 Kinder at 680 feet; The Texas Co.'s No. 2 mineral fee, at 1,130 feet; No. 3 mineral fee, at 320 feet; Texhoma Oil & Refining Co.'s No. 7 Harbison, at 1,170 feet; No. 8 Harbison, at 1,010 feet; No. 9 Harbison at 600 feet; No. 1 Kunkel at 820 feet; Underwood Drilling Co.'s No. 3 Rogers at 1,130 feet; White Brothers' No. 3 Kunkel, at 860 feet.

Wichita County Drilling

Brookover and others' No. 1 Hefley, at 1,124 feet; F. H. E. Oil Co.'s No. 1 Hefley, at 1,050 feet; Magnolia Petroleum Co.'s No. 2 Morgan, at 1,100 feet; No. 11 Roach, setting casing at 840 feet; Hunter and others' No. 1 J. W. Bailey, at 1,364 feet; Sims Oil Co.'s No. 2 Dutton, at 900 feet; Empire Gas & Fuel Co.'s No. 6 Pierce, at 1,976 feet; Gardner and others' No. 4 Watkins at 500 feet; Hawkins and others' No. 4, at 1,500 feet; No. 5 Watkins at 1,400 feet; Howell and others' No. 3 Burnett, at 990 feet; Humble Oil & Refining Co.'s No. 17 Douglas, at 768 feet; Kruger and others' No. 11 Allen & Kemp, at 1,000 feet; Magnolia Petroleum Co.'s No. 9 Abernathy, at 745 feet; No. 11 Maer at 700 feet; No 18 Maer, at 440 feet; No. 42 Rio Bravo underreaming; No. 43 Rio Bravo, drilling at 720 feet; No. 9-A Waggoner has oil showing at 1,465 feet; No. 3 Watkins, at 1,430 feet; Moore and others No. 3 Burnett, at 300 feet; Petroleum Production Co.'s No. 3 Allen and Kemp, at 600 feet; No. 12 Maer, at 800 feet; Riggs and others' No. 1 Burnett at 1,400 feet; Ryan Petroleum Co.'s No. 27 Nance at 1,000 feet; No. 28 Nance, at 500 feet; No. 29 Nance, at 800 feet; No. 1 Henson, cleaning out at 785 feet; Section Two Oil Co.'s No. 5 Burnett, has oil showing at 1,588 feet; The Texas Co.'s No. 298 Waggoner, fishing at 2,116 feet; Texhoma Oil & Refining Co.'s No. 14-B Burnett has oil showing at 1,822 feet; No. 1-E Burnett, at 962 feet.

Wilbarger County Drilling

Atlantic Oil & Production Co.'s No. 1 Parker, drilling at 1,600 feet; Bridwell and others' No. 5 Dill at 450 feet; No. 6 Stephens, at 2,289 feet; Bridwell and others' No. 7 Stephens, at 460 feet; No. 1 Waggoner, at 1,300 feet; Burton and others' No. 1 Castlebury, at 1,140 feet; No. 1 Waggoner, at 1,000 feet; Wood and others' No. 1 George, at 450 feet; Hamilton and others' No. 1 Kester, at 1,850 feet; Hoffer Oil Corp.'s No. 1 Waggoner cleaning out at 1,060 feet; Humble Oil & Refining Co.'s No. 3 Castlebury at 1,675 feet; No. 6 Castlebury at 730 feet; No. 7 Castlebury at 628 feet; No. 8 Castlebury at 743 feet; No. 9 Castlebury at 741 feet; No. 1 Waggoner, underreaming; Key and others' No. 1 Waggoner, spudding; Levy and others' No. 1 Waggoner has a good show of oil at 1,434 feet; Lippard Oil Co.'s No. 1 Fluhman; drilling at 1,250 feet; Little Oil Co.'s No. 1 Youngblood at 2,040 feet; McCamey and others No. 4 Richardson, at 400 feet; No. 2 Stephens at 680 feet; No. 4 Stephens, fishing at 1,270 feet; Magnolia Petroleum Co.'s No. 47 Skinner, drilling at 1,275 feet; Mulligan and others' No. 1 Waggoner, fishing at 1,110 feet; Noble Oil Co.'s No. 1 Waggoner at 2,262 feet; Priddy and others' No. 1 Castlebury at 1,600 feet; Prince Brothers' No. 1 Zipperle at 2,116; Ruff and others' No. 1 Waggoner underreaming; Skinner and others' No. 1 Streit, drilling at 2,445 feet; Staley and others' No. 2 Stephens at 800 feet; No. 3 Stephens at 400 feet; The Texas Co.'s No. 202 Waggoner, at 1,770 feet; No. 297 Waggoner at 1,438 feet; Texhoma Oil & Refining Co.'s No. 1 Beetis at 1,100 feet; No. 1 Thomas setting casing at 965 feet; Wells and others' No. 1 Waggoner, drilling at 410 feet; Winnipeg Oil Co.'s No. 1 Bond at 1,640 feet; No. 6 Bond at 540 feet; Wood and others' No. 1 Streit at 1,350 feet.

Young County Drilling

Anderson and others' No. 1 Graves at 610 feet; Burns and others' No. 1 fee, at 250 feet; Hinson and others' No. 1 Ribble at 2,940 feet; Johnston and others' No. 1 Daws' at 915 feet; Knight and others' No. 1 Bellamy, at 1,027 feet; Marland Oil Co.'s No. 1 Harrison at 3,015 feet; Miller and others' No. 1 Hume, fishing at 4,267 feet; Mitchell and others' No. 1 Finch at 650 feet; Murchison and others' No. 2 Campbell at 100 feet; No. 7 Gambrell running casing at 1,209 feet; No. 10 Gambrell at 1,020 feet; No. 11 Gambrell at 1,040 feet; No. 13 Gambrell at 200 feet; Olney Production Co.'s No. 1 Kemp, preparing to pump at 1,110 feet; O'Neall and others' No. 1 Clark drilling at 750 feet; Pace Drilling Co.'s No. 1 Bernhardt, cleaning out at 997 feet; The Texas Co.'s No. 1 Carr, drilling at 100 feet; No. 4 Gambrell at 965 feet; No. 8 Gambrell has oil showing at 850 feet; Texhoma Oil & Refining Co.'s No. 4 Gambrell at 1,222 feet; Welch and others' No. 1 Wilson at 1,099 feet; Whitehead and others' No. 1 Belknap Coal Co. spudding; Wurtz and others' No. 1 Wells at 350 feet.

Stephens County Drilling

Critten and others' No. 8 Cobb fishing at 3,323 feet; Illinda Oil Co.'s No. 4-A Walker and Caldwell at 2,600 feet; Interstate Consolidated Oil Co.'s No. 1 Lane, at 2,200 feet; Mid-Kansas Oil & Gas Co.'s No. 15 Hill fishing at 2,365 feet; No. 11 Tullos acct 1 at 3,970 feet; Snowden & McSweeney's No. 5 Higginbotham drilling by tools at 3,175 feet; Sun Oil Co.'s No. 5 Stoker at 1,430 feet; Texas Consolidated Oil Co.'s No. 6 Martin fishing at 3,310 feet; Walker and others' No. 4 First National Bank is underreaming; Welsh and others' No. 2 Brown at 900 feet; Brown & Co.'s No. 2 Akin at 960 feet; Head and others' No. 1 Post at 2,400 feet; Hughes and others' No. 4 Gandy at 2,206 feet; Knox and others No. 1 Flournoy at 3,840 feet; Landreth Production Co.'s No. 1 Gratz spudding; Magnolia Petroleum Co.'s No. 7 Brown fishing at 3,220 feet; No. 8 Brown fishing at 3,190 feet; No. 4 Jones setting casing at 460 feet; No. 5 Walker at 1,400 feet; Pender Production Co.'s No. 1 Elder spudding; Simms Oil Co.'s No. 4 Decker spudding; No. 6-A Jackson has a show of oil and gas at 2,980 feet; States Oil Corp.'s No. 2 Boles at 1,675 feet; Sun Oil Co.'s No. 6 Stoker at 3,767 feet; Texas Fidelity Oil Corp No. 1 Sahmore at 1,030 feet; Texas Pacific Coal & Oil Co.'s No. 50 Binney at 900 feet; No. 2 Hand acct 2 at 2,025 feet; No. 2 Pierce spudding; Texas Pacific Coal & Oil Co.'s No. 1 Smith at 3,577 feet; No. 1 Veale in black lime at 3,985 feet; Williams and others' No. 10 Roberquest drilling at 375 feet.

Eastland County Drilling

Allen and others' No. 1 Elliott at 300 feet; Dorothy Oil Co.'s No. 1 Downtain at 650 feet; Eldorado Oil & Gas Co.'s No. 1 Beard at 3,120 feet; McLester Oil Co.'s No. 1 Allen spudding; Magnolia Petroleum Co.'s No. 8 Hankins, cleaning out at 2,609 feet; No. 8 Harris, drilling at 1,190 feet; Parsons and others' No. 1 Jones, spudding; No. 2 Motes spudding; Pittman and others' No. 3 Ford drilling at 350 feet; No. 2 Pettit at 1,350 feet; Reclamation Oil Co.'s No. 6 Bond skidding rig; States Oil Corp.'s No. 2 Harbin drilling at 3,845 feet; No. 15 Harrell spudding; Woods and others' No. 1 Payte, drilling at 1,125 feet; Adams and others' No. 1 Donovan at 390 feet; Eastland Oil Co.'s No. 1 Hazel, showing 10,000,000 feet of gas at 3,241 feet; Hart Oil Corp.'s No. 1 Amis spudding; Kimmell and others' No. 1 Lamb drilling at 2,200 feet; Knight and others' No. 4 Underwood at 1,760 feet; Riley and others' No. 1 McClelland, in gray lime at 3,575 feet; Root and others' No. 1 Hazel underreaming; States Oil Corp.'s No. 6 Calvert and others at 470 feet; Weaver Oil Corp.'s No. 1 Hatton and others at 2,200 feet.

Brown County Drilling

Canyon Oil & Gas Co.' No. 7-A McDonough spudding; Gillman and others' No. 2 Moore drilling at 1,180 feet; Honea and others' No. 2 DeBusk at 2,323 feet; Moore and others' No. 1 Chambers at 290 feet; Moore & Wilson's No. 1 Westerman testing a sand at 1,290 feet; Williams and others No. 1 Newton underreaming.

Reagan County Drilling

Big Lake Oil Co.'s No. 16 University drilling at 2,170 feet; No. 18 University at 2,005 feet; No. 19 University at 200 feet; No. 20 University spudding; No. 22 University spudding; No. 23 University spudding; California Co.'s No. 1 University drilling at 3,335 feet; Cogdell and others' No. 1 University at 350 feet; Hoffman and others' No. 1 University at 720 feet; Pilot Oil Corp.'s No. 1 University, at 275 feet; Simms Oil Co.'s No. 1 Sawyer at 2,920 feet; Texon Oil & Land Co.'s No. 4 Group 1 University fishing at 3,075 feet; No. 5 Group 1 University skidding the rig; No. 6 Group 1 University spudding No. 7 group 1 University spudding; University Oil Co.'s fishing at 2,620 feet.

Wildcats Drilling

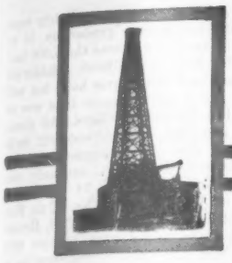
Hutchinson County: Barnum and others' No. 1 Johnson setting casing at 2,960 feet; Dixon Creek Oil Co.'s No. 1 Smith shutting off gas at 2,940 feet; Douglas Oil Co.'s No. 1 Whittenburg has show of oil at 3,020 feet; New Domain Oil Co.'s No. 1 Barton showing gas at 2,320 feet; Amarillo Oil Co.'s No. 2-A Givens showing 70,000,000 feet of gas at 2,643 feet; Prairie Oil & Gas Co.'s No. 1 Shaw drilling at 3,210 feet; Western Enterprise Oil & Gas Co.'s No. 1 Smith, plugging off salt water at 2,865 feet; Wilson and others' No. 1 Whittenburg drilling by tools at 2,905 feet.

Moore County: Amarillo Oil Co.'s No. 1-A Masterson fishing at 1,995 feet.

Potter County: Amarillo Oil Co.'s No. 1 Warrick setting casing at 2,843 feet; No. 1 Bush straightening crooked hole at 3,495 feet; No. 3-A Bivens at 1,953 feet.

Carson County: American Refining Co.'s No. 3 Burnett will drill deeper; Culbertson Brothers' No. 1 Armstrong, drilling at 3,505 feet; Premier Oil Corp.'s

(Continued on Page 197)



Kansas Oil Field News

By C. D. Lockwood

Rainbow Bend and Graham Fields in Cowley County present interesting possibilities; far from completely developed. Seventeen wells drilling in Rainbow Bend. Teeter Pool in Greenwood County extended. Twenty-eight completions during week in Kansas, three dry. Initial production, 6,021 bbls.

One or two fields in Kansas present interesting possibilities at this time from the standpoint of future production. The Rainbow Bend Field and the Graham Field, in Cowley County, are the two most promising of the newer fields in Kansas, and as yet are far from being completely developed.

The former, owned by the Waite Phillips Co., the Independent Oil & Gas Co., and the Marland Oil Co., with the Waite Phillips Co. holding one-half the ownership, the other two companies each having a quarter interest, is decidedly the more interesting of the two. Development has been proceeding slowly and carefully, so that the present producing and drilling wells form a cross in two ways along the property lines. As soon as the owners desire, they can proceed to fill the practically proven area with wells, which will undoubtedly bring the field decidedly into the major class. One well, on the Snyder lease, extended the field in the southeast direction, starting off at the rate of 3,500 bbls. per day. The Patterson well, one-half mile to the northwest, found no production in the Rainbow sand, and is being drilled to the same horizon from which the Graham Field produces. The Rainbow sand lies immediately on top of the Mississippi lime, whereas the Graham Field produces from below the lime. Should the latter sand be found productive in the Rainbow Bend Field, the total recovery expected of the field may be doubled. Even if the Patterson well does not find oil in the lower horizon, it would be unreasonable to conclude that a well drilled nearer the middle of the field would not find oil, as the Patterson well might be just outside of production in the lower as well as the upper sand.

17 Wells Drilling

At the present time, there are 17 drilling wells in the Rainbow Bend Field, including the Patterson well. The drilling depths of these wells on Friday, February 20, were as follows: No. 1 R. True, NE cor. NW, Section 29-33-3, 2,660 feet; No. 1 Patterson, SE cor. NE, Section 18, 3,345 feet; No. 8 Wertman, NE cor. NW, Section 20, fishing on top of sand at 3,308 feet; No. 2 Glasgow, SE cor. SW, Section 20, drilling at 2,755 feet; No. 11 Worthman, NW cor. SE NW, Section 20, 2,195 feet; No. 1 H. Nelson, NE cor. SE, Section 19, 1,175 feet; No. 1 J. Bates, S6 cor. NE, Section 19, 800 feet; No. 3 Baccus, SW cor. NW, Section 20, 1,050 feet; No. 4 Baccus, NW cor. Section 20, spudding in; No. 1 R. Johnson, NE cor. Section 30, 450 feet; No. 2 E. Nelson, SE cor. NE, Section 20, rigging up; No. 3 E. Nelson, NW cor. SE NE, Section 20, rigging up; No. 1 R. Douthitt, SE cor. Section 18, rigging up; No. 2 R. Johnson, NE cor. SE, Section 20, rigging up; No. 3 R. Johnson, SE cor. Section 20, building rig; No. 2 Bebee, NE cor. Section 29, building rig; No. 1 M. Caldwell, NW cor. Section 28, building rig.

Graham Field Development

Development in the Graham Field of wells not yet on production show the following: Marland Oil Co.'s No. 1 Orr, SW cor. SE SE, Section 3-33-3, drilling at 1,390 feet; Waite Phillips Co.'s No. 2 Alberta, SW cor. SE SE, Section 4, location; Marland Oil Co.'s No. 3 Graham, SE cor NE, Section 9, setting 6-inch at 2,964 feet; No. 4 Graham, NW cor. NE NE, Section 9, drilling at 1,340 feet; No. 5, SW cor. SE NE, Section 9, Rogers & Bitler and others' No. 1 1,966 feet with crooked hole; No. 6, NE cor. SE, Section 9, 250 feet; Waite Phillips Co.'s No. 2 Johnson, NW cor. NE SE, Section 9, 250 feet; Waite Phillips Co.'s No. 3 Wright, NE cor. NW, Section 10, 1,400 feet. Soon after sand was entered, spudding in; Roxana Petroleum Corp.'s No. 1 Spruens, NE cor. NW SE, Section 9, drilling at 1,350 feet; No. 2 Spruens, SE cor. NW SE, drilling at 1,360 feet; No. 1 Spruens, NW cor. SW, Section 10, 2,370 feet; No. 3 Spruens, NE cor. NW SW, 1,990 feet; No. 4 Spruens, SE cor. NW SW, 1,350 feet; No. 5, NW cor. NE SW, location.

The Marland Oil Co.'s No. 3 Graham, NW cor. NE, Section 9-33-3, entered sand and was swabbing 15 bbls. The Sinclair on Saturday, and started flowing 25 bbls. Oil & Gas Co.'s No. 1 Spangler, C SE an hour from 3,195-3,225 feet, with a SE NW, Section 13-32-4 was making 600 small amount of water. Monday morning bbls. from sand at 2,538-46 feet. The J. it had stopped flowing and was swabbing. A. Hull Co.'s No. 1 Kukuk, NW cor. NE,

Teeter Pool Extended

The sand is believed to be the Rainbow. Section 24-32-4, was shot with 180 quarts at 2,988-3,036 feet, and was making 100 bbls. The Marland Oil Co.'s No. 1, C SE NW, Section 33-34-3, was dry and abandoned at 3,852 feet. M. V. Foster's No. 1 Johnson, C NW SW NE, Section 30-34-4, was dry at 945 feet.

The Trees Oil Co.'s No. 2 Shaffer, SW cor. SE NE, Section 10-31-3, was spudding in at 125 feet. Shawver and others were building a rig for No. 3 Newton, C NW SW NE, Section 15-30-4. The S. H. E. Oil Co.'s No. 1 Elliott, C SE NE SE, Section 17-31-5, was spudding in. Roth and the Mission Oil Co.'s No. 1 Coffey, C NW SE NE, Section 30-31-5, was spudding in. Roth and others had a rig on the ground for No. 2 Hannah, NE cor. NW, Section 4-30-8. The J. A. Hull Co.'s No. 1 Newman, C NE NE SW, Section 13-32-4, was spudding in at 75 feet, and No. 2 Lewis, C SE SW NW, Section 24-32-4, was drilling at 1,000 feet. The same company's No. 1 Griffith, C NE SE NE, Section 14-32-4, was a rig. McIntyre and others had a rig on the ground for No. 1 Bartlow, C SE NE SE, Section 23-32-5. Shawver and others were spudding in No. 1 Jarvis, C NW NW SW, Section 35-32-5. The Phillips Petroleum Co. was spudding in No. 1 Hull, C NW NW SW, Section 24-22-3.

Greenwood County

The Skelly Oil Co. and the Emerald Oil Co.'s No. 1 Green, C NW NW NE, Section 15-23-9, in Greenwood County, was completed with sand at 2,337-97 feet, making 40 bbls. after a 40-quart shot. The Skelly Oil Co.'s No. 2 Teeter, C NW NW SW, Section 15-23-9, was completed with sand at 2,257-2,362 feet, making 250 bbls. after a 240-quart shot. Polhamus and others' No. 12 Marshall, NW cor. NE NW SW, Section 34-24-9, was dry and abandoned at 2,453 feet. The Lewis Oil Co.'s No. 2 Coulter, NW cor. SE, Section 9-25-9, was swabbing 20 bbls. of oil and 20 bbls. of water cleaning out after a shot of 40 quarts in sand at 2,150-76 feet. The Mid-Kansas Oil & Gas Co.'s No. 9 Ladd, C S half SE, Section 19-25-9, was completed with sand at 2,356-2,418 feet, and was making 175 bbls. after a 100-quart shot. R. G. Gillespie's No. 8 Griblin, CNL NE, Section 20-23-13, was making 15 bbls. after a 40-quart shot at 1,783-91 feet. Corry and others' No. 1 Brown, NW cor. NE, Section 30-25-13, was dry and abandoned at 2,103 feet. The Theta Oil Co.'s No. 8 Browning, C SW NW SW, Section 17-22-10, was dry and abandoned at 2,495 feet. The Mission Oil Co.'s No. 42 Thrall, C SW, Section 28-23-10, was completed with sand at 2,284-2,341 feet, and was making 50 bbls. after a 90-quart shot. The Mission Oil Co.'s No. 44 Thrall, C E half SE, Section 29-23-10, was making 40 bbls. after a 160-quart shot at 2,289-2,380 feet. The Skelly Oil Co. and the Emerald Oil Co.'s No. 1 Teeter, C SW SW SE, Section 10-23-9, was swabbing 225 bbls. after a 150-quart shot at 2,337-93 feet. The Skelly Oil Co. had a hole full of oil from sand at 2,288-96 feet in No. 4 Teeter, C NW NW SW, Section 15-23-9. The Tidal Oil Co.'s No. 1 Bass, SW cor. NW SW, Section 13-23-13, was dry and abandoned at 1,850 feet. Shaffer & Gowell's No. 11 Shindler, CWL NW SE NW, Section 15-23-13, was completed with sand at 1,539-1,610 feet, and was making 40 bbls. after a 140-quart shot, Simmons and others' No. 1 Mills, NW cor. SE, Section 26-23-11, was shot with 80 quarts in sand at 1,915-32 feet, and was making 30 bbls. The Theta Oil Co.'s No. 8 Browning, C SW NW SW, Section 17-22-10, was dry and abandoned at 2,495 feet.

Other Operations

The Empire Gas & Fuel Co. was building a rig for No. 15 Teeter, C NE SE NE, Section 16-23-9. McGinnis & Bitler had a rig on the ground for No. 6 Teeter, C SE NE NW, Section 15-23-9. Rogers & Reverley were building a rig for No. 2 Nuttle, C NW SW SE, Section 10-23-9. The Prairie Oil & Gas Co.'s No. 8 Helman, SW cor. SE SW, Section 14-24-9, was drilling at 650 feet. Lassen and others spudded in and shut down. No. 1 Wilkinson, NE cor. NW, Section 7-25-9. The Mid-Kansas Oil & Gas Co. had a rig up for No. 11 Ladd, C SW SE, Section

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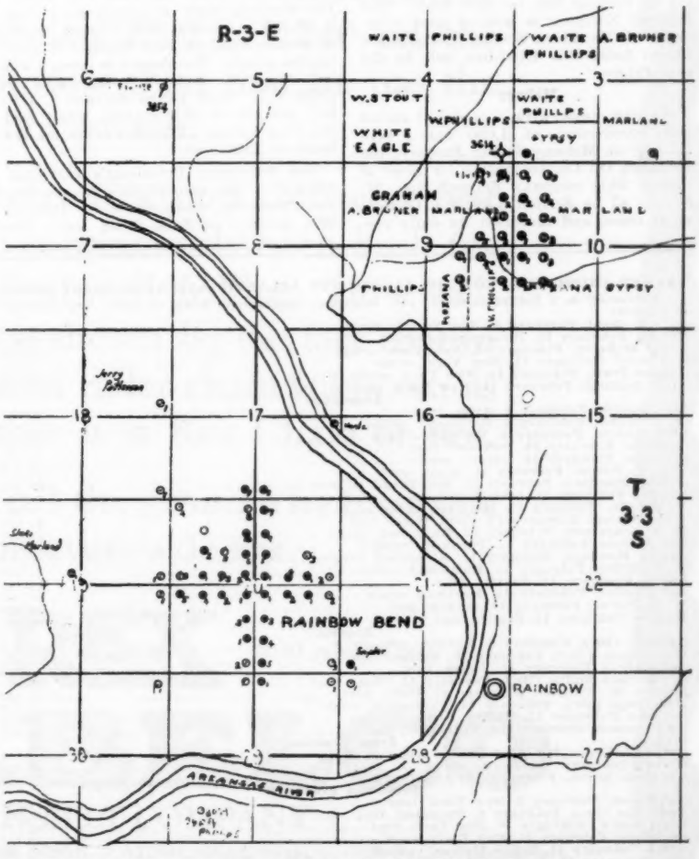

Map of Rainbow Bend Pool in Kansas

California Field Operations

By L. P. Stockman

California production in January 18,743,288 bbls., slight decrease from December. General Petroleum Co.'s completion at Ventura Avenue Field flows 1,530 bbls. Three fairly good wells completed during week at Rosecrans. Two small pumpers finished at Torrance. Ten locations staked at Inglewood.

LOS ANGELES, Cal., Feb. 21.—Production of crude petroleum in California during January totaled 18,743,288 bbls., as compared to 18,795,126 bbls. during December.

There was a light general decrease in the amount of development work done in California during January, when compared with the operations during December. There were only 62 new wells completed, 10 less than during December and, although the 77 new rigs erected during January were 4 in excess of the number put up during December, this was not reflected in a corresponding gain in the number of tools in operation. There were 432 drilling wells listed in December and only 429 in January. There was a big drop in the initial output of the wells finished during the past month. January's new completions added 21,286 bbls. of new production, 25,514 bbls. less than the new wells yielded in December.

There were 61 more wells producing in January than during December. Twenty-five drillers and ten former producers were abandoned in January, as compared with 18 drillers and 35 producers dismantled in December.

Torrance continued to head the completion list, although the 26 new wells finished in this field were only good for 2,478 bbls. of new production. Following Torrance came Midway-Sunset with 8 new wells to its credit, Rosecrans with 7 and Long Beach and Dominguez with 5 each. The largest well finished during the month was at Ventura, where the Associated's No. 9-A Lloyd was brought in doing 4,555 bbls. a day. Judging by the number of new rigs erected, Midway-Sunset, Ventura-Newhall, Rosecrans and Inglewood are all scheduled for additional development work.

Little Change at San Joaquin

There was very little change in the San Joaquin Valley fields from a development standpoint, some districts showing an improvement and others offsetting this advantage by similar reductions. The Midway-Sunset district continued, as was expected, to lead all other fields in this area in the amount of development work undertaken and projected. In the Maricopa section of this field there were two new wells added good for 450 bbls. a day in the aggregate, Berry & Ewing finishing well No. 5 and the Atlas Oil Co., No. 6. The former, on Section 31-32-24, was good for 100 bbls. a day of 14.1 gravity oil from 1,049 feet, while the latter on Section 30-12-23 was good for 350 bbls. of 23.4 gravity oil from 3,371 feet. There were four new holes started during the month of January, and although several new rigs were finished, actual drilling had not yet been started.

The Big Ten Oil Co. started work on No. 6, Section 36-32-23, and at the end of the month had reached a depth of a little less than 1,000 feet. The General Petroleum started work on two new holes on Section 35-12-24. No. 370 has been carried to 650 feet, while No. 395 is making hole at 1,951 feet. In addition to these two new wells, the company has one other string in operation, No. 60-A, on Section 12-11-24, which is down 1,080 feet. That additional work will, however, be undertaken in the near future is evidenced by the fact that three new derrick have been erected, No. 59-A, on Section 12-11-24, and Nos. 350 and 370 on Section 35-12-24. D. W. Whittier spudded in a prospect on Section 5-11-24 and had carried it down to 1,620 feet at the close of the month. In addition to these new holes started, there were some 10 or 12 others in proven area carried over from the previous month and several of them will undoubtedly be listed as completions within the next few weeks. On Section 36-12-24, the Ethel D. has a 2,270-foot hole in well No. 1-A, while the Kendon has a prospective producer in No. 3 on Section 36-32-24, now down 2,540 feet.

The Union will probably finish No. 3 on Section 4-11-23 as it shows 3,732 feet of hole at present. The Mascot's No. 4 at 3,270 feet and the Obispo Oil Co.'s No. 9 at 2,650 feet should also appear in an early completion list. The Pacific is working on two deep holes, one at 4,315 feet on Section 3-11-23, and another at 3,850 feet on Section 35-32-24. The Standard, doing more development work than any other single company, has five holes at various depths. On the Maricopa lease, Section 1-11-24, the company has carried No. 27 to 1,932 feet and is working on No. 43 Monarch, Section 2-11-24, around the 2,000-foot level. Nos. 56 and 57 M. J. M. & M. at 1,701 feet and 2,050 feet respectively and No. 1 Ross at 4,890 feet complete the company's drilling list in this field. The Midway Northern is making good progress with No. 11 on Section 32-12-23 and should finish this 4,100-foot hole in the near future.

Midway

Six new wells, with a combined initial daily production of 1,090 bbls., were finished at Midway during January, the Honolulu Oil Co. accounting for three of them. This company finished Nos. 27, 36 and 47 on Section 6-32-24, a Government lease, and increased its daily production 800 bbls. No. 27 was good for 150 bbls. from 2,948 feet, while No. 36 made 300 bbls. from 2,952 feet. No. 47 tanked 350 bbls. during the first 24 hours from 2,935 feet, the oil, as was the case in the other two instances, being clean and testing 28.4 degrees. The Honolulu is concentrating its attention exclusively on this lease and, in addition to the three wells finished in January, spudded in three more to take their place. The company is at present running five strings of tools and will probably continue to do so as several new derricks have been erected. The company's present drillers are No. 21 at 4,060 feet, No. 25 at 1,212 feet, No. 46 at 1,190 feet, No. 64 at 1,085 feet and No. 66 at 2,870 feet.

Although the Pacific is doing the largest amount of industrial work in this field, it was only successful in adding one new well to the producing list. The company's latest acquisition was No. 70 on Section 31-31-24, which pumped 50 bbls. a day of 26 gravity oil from 3,054 feet. Upon the completion of this well, the Pacific spudded in No. 17, which at present is down 2,865 feet. No. 236, also on this lease, is making hole at 3,182 feet. Judging by the depths of wells drilling, the Pacific should finish at least three wells within the next few weeks. The company made unusually good time in No. 65 on Section 25-31-23 and No. 51 on Section 5-32-24, both spudded in during the month. The former is down 2,328 feet, while the latter is going ahead at 2,652 feet. Bell Evans finished a 175-bbl. pumper of 16.5 gravity, when well No. 7 on Section 35-32-23 was put on the beam at 2,020 feet.

The Southwest Petroleum's first completion in this district was No. 1, Section 28-31-24, which made 75 bbls. of 26.1 gravity oil from 4,958 feet. The company's No. 2 should be an early completion if commercial production is to be secured, as it has passed the 5,000-foot level. The Midland Oilfields (California Petroleum) is drilling three holes but will probably not complete more than one of them within the next 30 days. All three, however, are good bets and excellent wells are looked for upon completion. The Chanslor-Canfield Oil Co. has only two drillers to its credit, No. 34 on Section 22-31-22 at 1,145 feet and No. 12 on Section 25-31-22 at 2,280 feet. The Brookshire Oil Co. started work on two new holes during the month and reports a depth of 2,430 feet in No. 14 and 809 feet in No. 15, both on Section 24-31-22. The North American has three potential producers in Nos. 14, 15 and 16 on Section 30-31-24, a Government lease, and should finish No. 14, now at 4,065 feet, within a short time. Upon the completion of this well, a new hole, No. 17, will be started, the rig for which has already been erected.

Elk Hills

One new well was finished in the Elk Hills Field during January, but one producer abandoned offset this increase. The Standard finished No. 43 Tupman and the Union abandoned its No. 7, Section 26-30-24. The Standard's new producer was good for 170 bbls. of 20.1 gravity oil from 3,250 feet. The completion of this hole leaves the Standard with but one driller, No. 17 Kern County, Section 31-30-25, at 3,290 feet. The Associated, Belridge and Pan American also have one driller each. On Section 26-30-24 the Associated has a 3,245-foot hole in No. 52, while the Belridge Oil Co.'s No. 4 on Section 34-30-24 is down 3,284 feet. The Pan American's single drilling well is No. 3 on lease 1, Section 1-31-24 at 3,082 feet. The Pacific is running four strings, all on Section 35-30-24. No. 8 is down 3,030 feet, No. 89 at 2,901 feet, No. 103 at 2,980 feet and No. 110 at 2,954 feet. The Petroleum Producers started a test well on Section 14-31-24 and is at present going ahead around 900 feet.

Only one small well was brought in at McKittrick but, since there is only a limited amount of drilling being done in proven area, this is not surprising. The Jantha Oil Co. finished a 25-bbl. pumper when No. 4, Section 6-30-22, was put on the beam. The oil, coming from 1,613 feet, tests 11.8 degrees in gravity. The Union is still working with No. 1 Wiecarver, Section 29-30-22, and, although it pumped about 15 bbls. a day on a preliminary production test some time ago, the company is still at work on it in the hope that larger production will be secured. The Berry Holding Co. has a 700-foot hole in No. 8-A on Section 13-30-21 and the Wesco Petroleum a 300-foot hole in No. 21 on Section 36-29-20.

Wheeler Ridge

Two wells were finished at Wheeler Ridge during January, both standing to the credit of the Standard Oil Co. One was a deep well on Section 28-11-20 and the other a shallow pumper on Section 27-11-20. The former, No. 15, was good for 100 bbls. a day from 4,000 feet, while the latter, No. 14, made 125 bbls. from 2,148 feet. The Standard is working on three drillers in this area at present but, since two new rigs have been erected, the number of strings in operation will probably be increased shortly. On Section 28-11-20, the company has three drillers, No. 10 at 4,350 feet, No. 11 at 3,943 feet and No. 13 at 1,931 feet. The General Petroleum should finish No. 3 Gillon, Section 28-11-20, within the next few weeks as it is at present down 4,303 feet.

The recent abandonment by the Midland Oilfields of its wildcat on Section 22-11-20 leaves this field in the hands of the Standard and General Petroleum companies, which control all of the present proven acreage. Production has been comparatively stable, due to the fact that the wells finished to date, although small, have proven quite consistent.

There is only a negligible amount of development work being done at Coalinga and Kern River and, as a result, only a few wells a year are finished in each district. There are only five wells being drilled at Coalinga, none of them looking

TANKER SHIPMENTS FROM LOS ANGELES TO ATLANTIC AND GULF COAST PORTS

Following is a list of tankers, date departed, destination, kind of cargo and amount in barrels:

S. C. T. Dodd, February 9, New York, refined	79,502
Hahira, February 11, Philadelphia, crude	75,362
David McKelvy, February 11, New York, crude	75,898
Agwipond, February 13, New York, crude	95,630
Charles Pratt, February 13, New York, crude	105,709
A. C. Bedford, February 14, New York, crude	115,205
Coastwise	
Los Angeles, February 9, Avon, crude	75,286
W. S. Miller, February 9, Richmond, crude	75,467
La Placentia, February 9, Martinez, crude	72,094
Stockton, February 10, Portland, fuel	65,648
Coalinga, February 10, Oleum, crude	75,874
Wm. F. Herrin, February 11, Avon, crude	45,580
Alaska Standard, February 11, San Diego, refined	10,552
Emidio, February 11, Seattle, refined	70,109
Montebello, February 12, Martinez, crude	75,940
J. A. Moffett, February 12, Point Wells, fuel	65,083
K. R. Kingsbury, February 12, Richmond, crude	85,311
Los Alamos, February 13, Portland, refined	40,028
Alaska Standard, February 13, Richmond, refined	10,870
W. S. Miller, February 14, Richmond, crude	75,469
Lebec, February 14, Seattle, fuel	75,002
Los Angeles, February 14, Martinez, crude	70,305
W. S. Porter, February 14, Seattle, fuel	55,224
Mojave, February 14, Seattle, fuel	75,303
Exports	
Gymeric (Br.), February 9, London, refined	42,960
War Nizam (Br.), February 10, Balboa, fuel	53,434
Adna (Br.), February 12, Japan, fuel	50,267
G. Harrison Smith (Br.), February 12, Chile, fuel	120,220
Mericos H. Whittier, February 12, Chile, fuel	65,493
Mina Brea (Br.), February 13, Vancouver, crude	45,777
Deroche, February 13, Balboa, fuel	85,114
La Placentia, February 14, Vancouver, fuel	65,912
From Ventura	
Frank G. Drum, February 10, Los Angeles, crude	51,708
Oleum, February 11, Oleum, crude	40,211
Frank G. Drum, February 14, Avon, crude	72,323
From San Francisco	
Agwimoon, February 9, New York, tops	77,180
Pianorbis (Br.), February 9, Shanghai, fuel	50,763
Dixie Arrow, February 10, New York, tops	85,712
Swiftsure, February 11, Fall River, tops	79,141
Atlas, February 12, Gray's Harbor, refined	12,385
Sun, February 13, Jacksonville, refined	79,546
Col. E. L. Drake, February 14, Honolulu, refined	38,967

Chabelco 1240

The *Genuine* Chabelco

SHOWN above are two links of Rex Chabelco 1240 dissembled so that you may judge the care and detail with which this chain is made to insure strength and accuracy in every working part.

But the Oil Field Man who knows his chain knows that all he needs to look for is the mark Rex Chabelco 1030 or 1240 on the side bars. He knows then that he has the chain that will not stretch.

Since Rex Chabelco 1030 and 1240 were first made they have continuously been built for the tough job of oil well drilling. How well they do the job is shown by the fact that in many fields all steel roller chain is known as Chabelco, whether it is Rex Chain or not.

You can always tell the genuine by the mark Rex Chabelco on every side bar.

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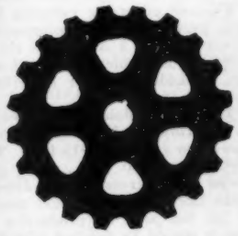
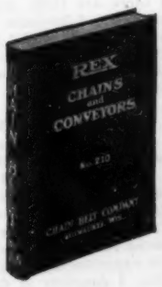
At left: strand of REX *genuine Chabelco 1030.*

Rex Safety Set Collar made of Certified Malleable Iron. Though stronger and more durable, it weighs only about half as much as a cast iron collar. Typical of the complete Rex transmission line.



Rex Temperim Sprocket Wheels have teeth and rim hardened to provide a harder surface of a tougher and more durable nature than the ordinary grey iron wheel.



The Chain Belt No. 210 Catalog and Engineering Data Book shown above consists of 512 pages. It lists in detail all information for the ordering and use of Rex Chain, Conveyors and Transmission Machinery.

very promising. The Netherlands has a 595-foot hole on Section 26-20-14, while the Ward has reached a depth of 726 feet in No. 11 on Section 12-20-14. The Premier is making slow progress in its No. 28 on Section 24-20-14 and only reports 600 feet of hole. The Coalinga-Mohawk is drilling ahead in No. 16, Section 12-20-15, at 4,670 feet, while the Coast Range on Section 17-19-15, is making hole at 1,625 feet. The greater part of the production at Coalinga is heavy oil but, notwithstanding recent price increases, there is still about 10,000 bbls. a day shut in. There are only two drillers in the Kern River Field, Aladin & Campbell drilling one hole on Section 9-29-28 and the Marland Oil Co. drilling the other on Section 16-28-27. Both look good for small pumpers upon completion.

There was very little change in the Lost Hills-Belridge area and, because of the fact that there are only two wells drilling, one at Lost Hills and one at Belridge, no improvement is expected for some time. About 2,000 bbls. a day are still shut in at Lost Hills and a similar amount curtailed at Belridge. One new well was started in each district during January. The Universal spudded in No. 44 at Lost Hills on Section 32-26-21, while the Bear State started work on No. 13 at Belridge, Section 34-28-20.

Rosecrans

Three fairly good wells were finished in the Rosecrans Field during the past week, all located in the northern part of the district. The San Joaquin Oil Co., organized a short time ago by Paul Getty, finished No. 1 at 4,343 feet, the 8¼-inch oil string landed at 4,219 feet. On its initial 24-hour production test the well tanked 1,230 bbls. of clean 36.1 gravity oil. The Sentinel Oil Co. got a 1,075-bbl. flowing well when No. 3 Athens was turned loose late in the week. It was drilled to 4,703 feet and finished with a 4½-inch oil string carrying 50 feet of shop perforated. The company is being delayed in No. 1 Athens as the result of a fishing job which developed some time ago at 5,410 feet, but is drilling ahead in No. 2 at 4,986 feet.

The Union finished another producer on its Howard Park lease when No. 6 was given a try at 4,919 feet. The initial production, 960 bbls., was clean and tested 37.8 degrees. No. 9 Howard Park looks like the Union's next producer and if the top zone is productive at 4,348 feet it should be finished within the next week or so. The Bankline Oil Co. killed No. 1 Gordon, which has been producing from 4,853 feet, and is preparing to deepen.

The Barnsdall seems to be experiencing considerable trouble with its three holes on the O'Dea lease but is having better luck with the Rosecrans property, on which there are three producers making approximately 1,500 bbls. a day, and two drillers, No. 4 at 4,252 feet and No. 5 at 620 feet. No. 1 O'Dea has been standing idle for some time but the company is working on No. 2 at 4,140 feet and No. 3 at 4,020 feet.

Other Rosecrans Operations

W. H. Fisher, who has operated quite successfully at Long Beach, is going right ahead with his drilling program in this field. In addition to No. 10 just spudded in, Fisher has his No. 8 at 4,304 feet, No. 9 at 2,370 feet and material on ground for No. 11. The General Petroleum is experiencing some little difficulty with No. 1 Amestoy at 6,666 feet and it does not look as though the company will be successful in securing commercial production. No. 2 Vaughn, however, is more favorably located and looks quite promising at 4,831 feet. George F. Getty cemented his No. 2 Athens at 4,234 feet but is going ahead in No. 1 at 4,865 feet. The Hercules Gasoline Co. took a core in No. 1 Rosecrans at 4,303 feet but the formation was a gray sand which did not react to the ether test. Julian spudded in another well on his Athens property and brought his total number of holes in this field to three. No. 1 is standing cemented at 4,921 feet, No. 2 drilling at 570 feet and No. 9 going ahead at 4,901 feet. The Marine Oil Co. is building a rig for its fifth well and has staked a location for another. The company at present has one producer, No. 31, flowing aproximately 1,230 bbls. a day, and three drillers, No. 32 at 4,385 feet, No. 33 at 4,325 feet and No. 34 at 3,855 feet. E. J. Miley has four promising holes and it would not be surprising if one of them, No. 3 now at 5,150 feet, was put on production during the coming week. The 8¼-inch will be run in Nos. 4 and 5 within the next day or so and No. 6 should be cemented above the pay within the next two weeks. The Mohawk Oil Co. should spud in No. 1 Bateman and No. 1 Dixon within the next few days and when work is started on these two holes the company will have four strings of tools in operation.

A string of 8⅝-inch has been cemented in No. 1 Brooks at 4,318 feet, while No. 1 Mahler is being prepared for production at 4,843 feet. The Pacific Petroleum is building a rig for its second well, No. 3 Athens, but will probably not be in a position to start work within the next two or three weeks. The Petroleum Midway is held up in both No. 1 Baskin at 4,300 feet and No. 1 Folsom at 4,781 feet with stuck core barrels and is fishing for a drill collar and bit in No. 1 Kreitz Community at 4,070 feet. The company's No. 1-A Ducommon has reached a depth of 4,230 feet, No. 1 Fox 3,660 feet and No. 1 McCormick, 4,506 feet. No. 1 Rowell of the St. Helens is looking quite discouraging of late at the present depth, 5,190 feet, no change for the better is noted. The Shell's No. 1 Leonis at 5,336 feet also looks like a dry hole, the formation at this depth being a hard gray sand. The Standard took a core sample in No. 1 Cowan at 5,957 feet but it was negative and this northeast outpost is looking more like a duster every day. The Star Petroleum has resumed work on No. 1 Shoemaker and will attempt to finish a commercial producer if the water present in this hole can be excluded.

Deep Test at Dominguez

The Marland Oil Co. has started work on what will be a deep test in the southeastern section of the Dominguez Field. An 18-inch stove pipe is being set in this well, No. 7 Dominguez at 1,115 feet. The company is working on both Nos. 4 and 6, trying to locate water trouble, but so far has not had any success. The Henderson Petroleum made a careful test of the showings found in No. 1 Susana in the northeastern part of the field at 4,124 feet and, concluding they would not result in commercial production, resumed drilling. The hole is at present down 4,200 feet, the log showing the formation to be a hard, gray sand. The United Oil Co. is working on Nos. 2, 3 and 4 Dominguez and may bring in either No. 2 at 4,442 feet or No. 4 at 4,257 feet. Water is holding up their completion, however, and it may be several weeks before they are actually finished. The Shell is battling with a difficult water problem on its Manuel lease, and, as a result, Nos. 1, 4 and 5 are still on the drilling list.

Torrance

Two small pumpers were finished at Torrance during the past week. George F. Getty put his No. 25 Torrance on the beam at 3,400 feet after finishing it with a 6¼-inch liner carrying 535 feet of 80-mesh screen. The initial daily output, 96 bbls., tests 19.2 degrees and shows a cut of 3 per cent. The Selby-Root Oil Co. secured a 92-bbl. pumper when No. 10 was put on the beam. It was drilled to 3,798 feet and finished with a 4¾-inch liner, including 280 feet of 60-mesh screen. The General Petroleum has three wells about ready for a production test on the Poggi Leage, No. 1 at 3,824 feet; No. 2 at 3,825 feet and No. 4 at 3,817 feet. They will probably be put on the beam within the next week or 10 days. In addition to these three, the company is working on three other holes on the Poggi property, No. 3 at 2,800 feet; No. 5 at 2,240 feet and No. 20, a plug back from 3,750 feet to 3,717 feet. Rigs have been erected for Nos. 6, 7 and 8, but they have not yet been spudded in.

The Lora J. Oil Co. is abandoning its two deep tests, No. 1 drilled to 4,780 feet and No. 2 carried to 4,200 feet. The Shell will probably follow a similar procedure with No. 2 Kettler, carried down to 5,374 feet and later plugged back by stages. This hole does not even look promising and an early abandonment is anticipated.

The Chanslor-Canfield Midway Oil Co. has temporarily suspended work on its deep hole, No. 2 Domingues, carried down to 5,091 feet, but later plugged back in search of production, without success. The company has drilled up practically all of its Lomita acreage and from now on will devote its attention to the Torrance end of the field, where the discovery well was drilled and the company has considerable undeveloped acreage. Wells in this area will be considerably smaller than those finished in the Lomita section, but with better prices prevailing for crude, small pumpers will again be profitable.

Long Beach

There were no wells actually finished at Long Beach during the past seven days, although one, the Pan-American's No. 1 Pyle-Kaufman, made a small flow from 4,903 feet. Production was not sustained, however, and the company will probably be obliged to put the well on the beam. The Bolsa Chica Oil Co. will try to finish its No. 2 in the upper zone because of pipe and mechanical trouble which developed at 4,934 feet. The company may be able to finish a small pumper around 3,000 feet. The A. T. Jergins Syndicate finished No. 15 Municipal at 4,118 feet and will put it on a production test within the next week or ten days. No. 16 is being rigged up and this hole will probably be spudded in upon the completion of No. 15.

W. R. Ramsey's No. 5-B. Municipal is drilling in an oil sand at 4,425 feet and looking unusually good. This hole should be finished within the next few weeks.

Huntington Beach

The Associated has No. 2 Wardlow at Huntington Beach about ready for production and this 3,552-foot hole should be good for about 100 bbls. a day on the beam. The Standard finished well No. 29 on Lease B at 4,385 feet and secured a 125 bbl. pumper, the oil testing 20 on Lease B at 4,385 feet and secured a 125-bbl. pumper, the oil testing 26.5 degrees and cutting 6 per cent. This hole was finished with a 6¼-inch oil string carrying 540 feet of 80-mesh screen.

Inglewood

About 10 new locations were staked at Inglewood during the past week but it is not known just how long actual drilling will be deferred. Conditions are favorable, however, for new work because of the rapid drilling possible in this area. The Associated has staked locations for two new wells on its Vickers property, No. 1, an offset to the Mohawk's No. 1 Machado, and the other, a Standard Oil offset. The Pan-American is drilling ahead in No. 2 Sentous at 1,400 feet and is putting the finishing touches on the rig for No. 7. The Petroleum Securities (Doheny) finished drilling No. 1 Cone at 1,414 feet and should put it on the beam during the coming week. A rig is being erected for No. 3 and grade made for No. 4. Oscar Howard secured a successful water shut off in his well No. 1 at 1,770 feet and immediately resumed drilling. The hole is at present down 2,156 feet. The Petroleum Midway spudded in No. 1 Smith early in the week and yesterday showed 1,520 feet of hole. No. 1 Moynier, the Petroleum Midway's second hole, is all rigged up and should be spudded in within the next few days.

The Standard has not yet spudded in its new holes on the Vickers lease but should do so shortly, as the rigs are just about finished for Nos. 2 and 3 on Lease 1, while on Lease No. 2 is being rigged up. The company's two drillers on Los Angeles Investment Lease No. 2 are No. 1 at 4,955 feet and No. 2 at 1,100 feet, but neither looks promising. No. 1 Potter-Smith is down 5,900 feet, while No. 1 Stocker is going ahead in a hard sand at 4,300 feet. The Universal Consolidated Oil Co. is rigging up rotary equipment in No. 1 Youngsworth and will probably spud in within the next few

(Continued on Page 184)

East Central Texas

By a Staff Correspondent.

MEXIA, Tex., Feb. 21.—After the production of the Wortham Field had dropped to 60,000 bbls. a day, it made a quick recovery to 75,158 bbls. a day from 248 wells. The increase in production was due to a general cleaning out of wells.

Heavy swabbing put the wells in bad condition and made it necessary to clean out to the bottom and to wash the liners. As an indication of the effect of cleaning out, the Humphreys Boyd Oil Co.'s Simmons lease may be cited. It was falling off in output alarmingly but when the wells were cleaned out to the bottom and then put on the pump the production increased to 2,800 bbls. a day. Collins & Wheelock are having very good success with compressed air and have about 3,000 bbls. production a day. It is expected that this increase in production will be only temporary and that the field will again settle back. The new southern extension of the field will give the Humphreys Boyd Oil Co. a good production but it will not be up to original expectations. The extension is not over four locations wide.

The Humble Oil & Refining Co. still has faith enough in the Ella Dodd property in the extreme north end of the field to make a couple of new locations which, if they come in as oil wells, will extend the pool in that direction, but they are not expected to be big wells.

There is a great race on in the Bazette area between Bob Penn and the Atlantic Oil Producing Co. on one farm and the Humphreys Boyd Oil Co. on another to complete the first well in that field. The Penn-Atlantic test was drilled 1,300 feet in 55 hours. Both tests are expected to have casing ready to set on top of the Woodbine by February 23.

At midnight on Friday Penn and the Atlantic Oil Producing Co. had drilled to 2,470 feet in their test on the Abshut farm in the Bazette area without finding the Austin chalk which was expected just below 2,100 fet. As the presence or absence of the Austin chalk at regular depth is regarded as an index of what may be expected of a test in the Mexia fault zone, it is needless to say that there was considerable nervousness felt among those who paid or were responsible for the payment of from $500 to $1,000 an acre for leases in the Bazette area. The Hnmphreys Boyd Oil Co.'s test which is being drilled a little east of the Penn-Atlantic test was delayed for lack of fuel and had only reached a depth of 1,650 feet when last heard from and its progress was being anxiously watched.

The production of Wortham for the 24 hours ending Friday at 7 a. m. was 78,867 bbls. from 253 wells.

J. R. Patty is drilling a test on the Hornbeck farm, 1½ miles east of the town of Tehuacana and 3½ miles west of the south end of the Wortham Field. It has a sand at 3,035 feet, but has not yet shown any indications of oil.

In McLennan County a closely watched test of the Cly Oil Co. on the Doctor Harrison farm tested dry at 996 to 1,019 feet. This well was drilled north of Axtell and near a well drilled by Wirt Franklin of Ardmore, Okla., two years ago, which had a showing of 43 gravity oil at about 1,000 feet. Franklin is drilling another test one-half mile east of the Cly Oil Co.'s well.

Production on February 17

The production of the East Central Texas Field as of Tuesday, February 17, was as follows: Wortham, 74,989 bbls. from 248 wells; Powell, 56,545 bbls. from 752 wells; Mexia, 17,540 bbls. from 470

(Continued on Page 184)

The Frick-Reid Supply Co.

Quality Equipment

AXELSON MACHINE COMPANY — Upset Double Pin Steel Sucker Rods, Reinforced Steel Pull Rods, Axelson and Amco Plunger Liner Working Barrels, Noxon Stuffing Boxes.

BEAUMONT IRON WORKS COMPANY — Dreadnaught Rotaries, Pumps, Draw Works, Kellys, Swivels. Fish Tail Bits, Tool Joints, Casing Heads, Steel Fittings, etc.

CARBIC MANUFACTURING COMPANY — Oxyacetylene Welding and Cutting Apparatus.

**DONOVAN BOILER WORKS—Oil Country Boilers, Locomotive and Code Type, 40 to 80 Horse Power. Gas Traps; 100 Barrel Welded Steel Tanks.*

FRICK-REID — 1-KW Turbine Generator and Accessories.

FRICK-REID—Service Rubber Belting, stitched and friction surface.

JOHNS-MANVILLE COMPANY — Packing to meet every need.

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ROSSENDALE-REDDAWAY BELTING & HOSE COMPANY—"CAMEL HAIR" Belting for all conditions.

STANDARD SEAMLESS TUBE COMPANY—High Carbon Seamless Casing, Drill Pipe and Tubing.

STRUTHERS-WELLS COMPANY — Steam Drilling and Pumping Engines.

WHITLOCK CORDAGE COMPANY—Manila Cables and Bull Ropes.

*DONOVAN BOILERS

Last Summer a Donovan Boiler in the Smackover field had the crown sheet badly burned. Forty-seven stay bolts were pulled and other damage done. The job was repaired, using the same stay bolts, and within ten hours this boiler was popping off at 140 lb. pressure.

The boilermaker who made the repairs had been in the business for twenty years. He made the statement that any other boiler, going through what this Donovan did, would have been absolutely ruined,—that it was made of the toughest steel he had seen in all his experience.

The owners of the boiler say that it had already drilled four 2000′ wells, cutting 11½″ hole. They had never found it necessary to wait for steam. The drilling superintendent declared that from Spindletop to the present time he had never found an equal to the Donovan Boiler, and that he always welcomed an opportunity to recommend it to any human being.

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FRICK-REID SUPPLY COMPANY
TULSA, OKLA.

West of the Mississippi—Stores Everywhere

In Eastern Fields—Frick & Lindsay Co.

North Louisiana-Arkansas

By M. L. Vaughn

Arkansas production practically unchanged, increase in Smackover heavy, offsetting loss elsewhere. North Louisiana gains 1,254 bbls. Blowing in of gasser at Waskom increases interest in Gulf Refining Co.'s deep test. Wildcat test in McCurtain County, Oklahoma, starts leasing activity.

SHREVEPORT, La., Feb. 23. — Production in the Arkansas oil fields remained practically unchanged since the previous week, the daily output of the field averaging 104,195 bbls., a decrease of only 60 bbls. a day. An increase of 825 bbls. a day in Smackover heavy was more than offset by a slight decrease in all other Arkansas districts. Daily average production for the past week was as follows:

South Arkansas

El Dorado	9,225
Nevada County	1,015
Smackover light	32,230
Smackover heavy	59,660
Stephens	2,065
Total	104,195

The North Louisiana Field showed an increase during the past week of 1,254 bbls. a day, the average daily production amounting to 50,057 bbls., distributed as follows:

North Louisiana

Bellevue	3,730
Caddo light	9,577
Caddo heavy	2,255
Cotton Valley	8,235
De Soto and Red River	4,315
Elm Grove	695
Haynesville	14,550
Homer	6,700
Total	50,057
Total both fields	154,252
Increase	1,194

Big Waskom Gasser

Of more than usual interest to the oil fraternity and to this community is the blowing in of a big gasser Friday night in the Waskom district, west of Shreveport, in the deep sand now being explored by a number of big operators. The well is being drilled by the Gulf Refining Co. in an effort to locate a deep gas producing sand which will prove of a more permanent nature than that previously developed in this territory. Located on the Waterman Lumber Co. lease in the E. Pollack survey, 200 yards west of the Louisiana State line, in Harrison County, Texas, the well blew in unexpectedly at a depth of 2,804 feet, making anywhere between 15,000,000 and 30,000,000 feet of dry gas. No accurate gauge has been made of the well and there is considerable 2½-inch drill stem left in the hole, but the development is considered of the utmost importance as the probable source of a new gas supply for Shreveport and the surrounding country. The Waskom Field is between 15 and 18 miles west of Shreveport.

Interesting Wildcat

An unusually interesting wildcat test is scheduled to start drilling when I. A. O'Shaughnessy and Carl B. Hnun, oil operators of Blackwell, Okla., will spud in for a cable tool test, prepared to go 3,000 feet if necessary. The well is in the northeast quarter of the southeast quarter of Section 12-1s-26e, in McCurtain County, Oklahoma, 9 miles west of Hatfield, in Polk County, Arkansas, 2½ miles beyond the Arkansas State line.

Ten thousand acres of leases have been secured around the well, part in Arkansas and part in Oklahoma, and the test will be made on a structure located by Dr. Charles W. Honess, now with the Empire Gas & Fuel Co., and rechecked by H. M. Scott, chief geologist for the Phillips Petroleum Co., who also made the location.

Completions

Union County, Arkansas

The Lion Oil & Refining Co.'s No. 5 Graves, one of the first deep wells to attract attention in this field, is again in the limelight when on being deepened to 2,371 feet, it came in flowing 5,000 bbls. of hot salt water with 1,000 bbls. of oil. The last time a test was made of this well, it came in flowing 2,500 bbls at 2,289 feet, 90 per cent saltwater. This test was made in November, 1924.

The Houston Oil Co. brought in its first test on the Miller land in Section 3-16-15 in the north end of the Norphlet district flowing at the rate of 2,000 bbls. of fluid a day of which 90 per cent is saltwater. It was completed at 2,293 feet and is making 5,000,000 feet of gas.

The Lion Oil & Refining Co. junked the hole at 2,410 feet in its deep test, No. 4 Allgulf, Section 17-16-15, and the well has been abandoned.

The Ohio Oil Co. completed No. 5 Pate in Section 10-16-15, making a 75-bbl. pumper at 1,990 feet.

The Pure Oil Co.'s No. 2 Nicks, Section 20-16-15, made a 75-bbl. pumper at 2,135 feet and its No. 1 Lawton, Section 30-16-15, was abandoned at 3,555 feet.

Ouachita County

In the Smackover Field, there were 15 completions made during the past week, all producers except one, with an aggregate initial production of 1,050 bbls.

The Forest Oil Co. completed No. 1 Cramer, Section 27-15-16, pumping 125 bbls. at 2,270 feet.

The Gulf Refining Co.'s Werner A-8, Section 26-15-17, made a 60-bbl. pumper at 2,299 feet.

H. L. Hunt and others' completed Green B-6, Section 23-15-17, flowing 100 bbls. at 2,329 feet; No. 3 Halton, Section 23-15-17, pumping 120 bbls. at 2,375 feet, and No. 4 Street, Section 26-15-17, pumping 55 bbls. at 2,357 feet.

Kourey and others completed No. 1 Churchyard, Section 28-15-16, pumping 60 bbls. at 2,069 feet.

The Mazda Oil Co.'s No. 2 Berry, Section 33-15-15, made a 45-bbl. pumper at 2,000 feet.

H. I. Schmuller completed No. 1 Wells, Section 25-15-17, pumping 20 bbls. at 2,305 feet.

The Simms Oil Co.'s Berg E-3, Section 30-15-15, is swabbing 100 bbls. a day at 2,022 feet.

J. S. Smith abandoned No. 1 Shirley, Section 35-15-17, at 2,274 feet.

Staples and others completed No. 4 Smith, Section 36-15-17, pumping 40 bbls. at 2,297 feet.

The Texas Co.'s No. 2 Johnson, Section 3-16-15, is pumping 40 bbls. at 1,965 feet, and No. 4 Reynolds, Section 23-15-17, 125 bbls. at 2,322 feet.

Whittaker and others completed No. 1 Green, Section 23-15-17, pumping 125 bbls. at 2,379 feet.

Whittiken and others completed No. 5 Anderson, Section 23-15-17, flowing 50 bbls. at 2,298 feet.

Cotton Valley

Two producing wells were brought in during the week in the Cotton Valley district, adding 240 bbls. to the output.

The Crusader Oil Producing Co. completed Hope Estate B-6 in Section 13-21-10, pumping 180 bbls. at 2,519 feet.

The Ohio Oil Co.'s No. 15 Bodcau in Section 28-21-10, made a 60-bbl. pumper at 2,578 feet.

Bossier Parish

McClure and Farrell abandoned their test on the Atkins lease in Section 3-18-12 at 1,136 feet.

De Soto Parish

Dr. Wright and others abandoned their test, No. 2 Sutherland, Section 18-12-14, at 2,614 feet.

La Salle Parish

The Stovall Drilling Co. tested dry at 2,033 feet in No. 2 Louisiana Central Lumber Co., Section 27-10-2e, and the well has been abandoned.

The Urania Petroleum Co. junked the hole in No. 5 Urania, Section 18-10-2e, and the test has been abandoned.

Ouachita Parish

The Southern Carbon Co. junked the hole at 2,500 feet in No. 43 fee, Section 31-19-5, and the test has been abandoned.

Red River Parish

Le Grande and others got saltwater at 2,440 feet in No. 3 fee, Section 2-14-12, and the test has been abandoned.

Drilling Operations

Union County, Arkansas

There is continued drilling activity in the El Dorado and Smackover Fields, evidenced by the new derricks and rigs.

Bradley and Cazart have shut down their No. 1 Pate, Section 16-17-17, at 850 feet; Broderick and Calvert set 4½-inch casing at 2,380 feet in their No. 2 Bradford, Section 8-16-15; J. W. Clark is drilling No. 2 Palmer, Section 9-16-15, at 50 feet.

Coats and Sowell set 12-inch casing at 60 feet in No. 1 Springer, Section 36-17-16; Crawford and Sebastian are drilling No. 8 Giller, Section 14-16-15, at 1,675 feet; the Crusader Oil Producing Co. set 15-inch casing at 65 feet in No. 5 Graves, Section 3-16-15; W. A. Dellmeyer, trustee, is drilling No. 1 Ezell, Section 13-17-15, at 1,500 feet; Doern and others are drilling No. 1 Bradley, Section 4-19-16 at 1,015 feet.

Gulf Refining Co. set 6-inch casing at 1,875 feet in No. 12 Alphin, Section 2-16-15; set 6-inch casing at 2,250 feet in No. 1 T. P. Howard, Section 13-16-17; set 6-inch casing at 2,575 feet in No. 31 L. Werner, Section 5-16-16; rigging up No. 35 L. Werner, Section 6-16-16.

Hollyfield and others set 10-inch casing at 63 feet in No. 7 Giller, Section 11-16-15; Howell and others are rigging up No. 3 Williams, Section 3-16-15; Jones and Ganzell are rigging up No. 1 Murphy, Section 36-19-14.

Lion Oil & Refining Co. set 10-inch casing at 507 feet in No. 5 Flenniken, Section 10-16-15; set 12-inch casing at 507 feet in No. 1 Hays, Section 4-16-15.

Magnolia Petroleum Co. tested dry No. 4 Campter-Campbell, Section 13-16-17, with show of oil at 2,358 feet, and are now bailing to test 12 feet of sand at 2,360 feet; swabbing No. 3 Harris, Section 16-16-16, and it is full of salt water at 2,655 feet; arranging to set 6-inch casing at 2,385 feet in No. 2 J. G. Smith, Section 2-16-17. The total depth of this well is 2,392 feet.

Murdock and others set 12-inch casing at 503 feet in No. 3 Bilyew, Section 8-16-15.

Natural Gas & Petroleum Co. set 6-inch casing at 2,040 feet in No. 6 Murphy, Section 8-16-15; Ohio Oil Co. has derrick up for No. 3 Ballard, Section 14-16-15; Phillips Petroleum Co. has derrick up for No. 8 Giller, Section 10-16-15 and rigging up Nos. 9 and 10, Section 11-16-15.

Pure Oil Co. set 12-inch casing at 62 feet in No. 11 Craig, Section 15-16-15; arranging to drill deeper from 2,065 feet in No. 1 Dumas, Section 16-16-15.

Sam Richardson has derrick up for No. M-1 Murphy, Section 14-16-15; Russell and others are rigging up No. 1 Brown, Section 8-17-14; Rutledge, trustee, set 10-inch casing at 65 feet in No. 5 Hodges, Section 6-16-18.

Standard Oil Co. is drilling shale at 1,700 feet in No. 2 J. H. Alphin, Section 2-16-15; set 6-inch casing at 1,930 feet in No. 16 J. H. Alphin, same section.

The Texas Co. is rigging up No. 3 Calloway, Section 4-16-15; Unity Petroleum Co. is drilling No. 6 Roper, Section 3-16-15, at 1,400 feet; and set 12-inch casing at 65 feet in No. 7 Roper, same section. Weatherbee and others are drilling No. 4 Rice, Section 6-16-16, at 1,905 feet.

Ouachita County, Arkansas

There has been considerable activity in the Ouachita area during the past week, as will be seen by the number of new wells commenced, and also 15 completions.

The Arkansas Drilling Co. is drilling No. 6 Reynolds, Section 24-15-17 at 1,985 feet; Boyd and Bonham, fishing for drill stem at 2,230 feet in No. 1 Stringfellow, Section 28-15-16; Bray-Hawthorne set 6-inch casing at 2,118 feet and drilling at 2,200 feet in No. 1 Elliott, Section 11-15-17; drilling at 2,470 feet in No. 1 Goodwin, Section 12-15-17.

Cumberland Petroleum Co. tested 1,000 feet of oil and 24 feet of sand at 2,200 feet in No. 4 Reynolds, Section 23-15-17, and arranging to test 28 feet of broken sand at 2,313 feet; derrick up for No. 4 Reynolds, same section; Eberhardt and others have derrick up for No. 1 Gibson, Section 27-15-17.

El Dorado Union Oil Co. is rigging up No. 3 LaGrone, Section 36-15-17; Kilts and Dumas set 6-inch casing at 2,233 feet in No. 4 Forest City Box Co., Section 31-15-16; Forest Oil Co. set 10-inch casing at 160 feet in No. 10 J. A. Cramer, Section 27-15-16.

Foster & McWilliams are waiting on standard rig, with 1,800 feet of oil and 5 feet of sand at 2,266 feet in No. 1 Nelley, Section 26-15-16; Guy Freely set 10-inch casing at 61 feet in No. 1 Gibson, Section 26-15-17, and derrick up for No. 2, same section; George and Jones are drilling at 1,950 feet; No. 3 Unsted, in Section 4-16-15.

Giles and others are rigging up No. 1 Nelley, Section 26-15-16; Gray and others set 6-inch casing at 2,200 feet in No. 3 Myar, Section 32-15-16; Gilliland and others have derrick up for No. 6 LaGrone, Section 36-15-17; drilling No. B-5 Myar, Section 30-15-16 at 1,605 feet.

Gulf Refining Co. set 6-inch casing at 1,887 feet in No. 2 S. Bennett, Section 32-15-15; set 10-inch casing at 96 feet in No. 9 Fincher, Section 33-15-16, and in Section 5-16-15, drilling No. A-4 Goodwin at 2,185 feet; set 10-inch casing at 95 feet in No. 1 Burkett, Section 7-15-16; in Section 28-15-16 are arranging to test 8 feet of sand at 2,292 feet in No. 8 Hardin; in No. 3 Reynolds, Section 23-15-17, waiting on standard rig with 1,700 feet of oil and 15 feet of sand at 2,305 feet, and derrick up for No. 4 Reynolds, same section. The Gulf Refining Co. tested show oil and salt water in No. 32 Werner, Section 32-15-16, and waiting orders in 11 feet of sand at 2,254 feet; waiting on standard rig with 650 feet of oil and 4 feet of sand at 2,250 feet in No. 33 Werner, Section 32-15-16; set 6-inch casing at 2,225 feet in No. A-9 Werner, Section 26-15-17, and in same section set 6-inch casing in No. A-10 and now drilling plug; rigging up No. A-11; derrick up for No. A-12, and made location for No. A-13, all in Section 26-15-17; in Section 32-15-16, derrick up for No. 36 Werner, and rigging up No. 37 Werner, same section.

Howell and others are waiting on

(Continued on Page 48)

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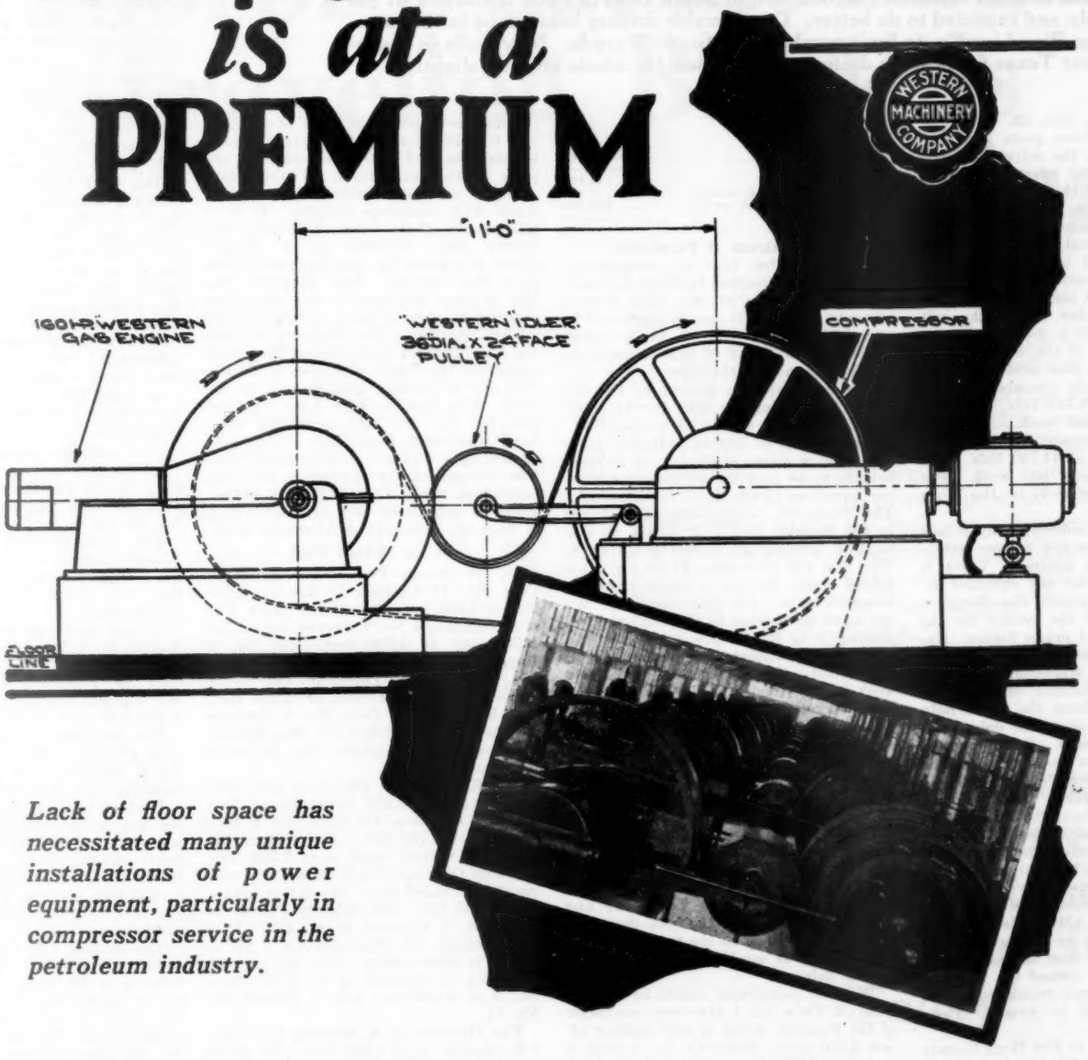

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Gulf Coast Oil Operations

By P. L. McGreal

Mills Bennett completes second well in South Liberty Pool, it starting at 800 bbls. and expected to do better. Considerable drilling being done in that area. Sun Pipe Line Co. to limit purchases of Grade B crude. New wells in southwest Texas fields show decline. Production for whole area up slightly.

HOUSTON, Tex., Feb. 23. — Completions in the Gulf Coast pools numbered 32 last week, due to the activity inaugurated with the recent advance in crude quotations. Ten of these were worked-over wells. The new production totaled 7,010 bbls. The Orange Pool contributed 3,550 bbls. of the total, Goose Creek 600 bbls. and Hull 700 bbls. The second well in the new South Liberty district came in flowing 800 bbls. initial output. The dry holes number 3 and the salt water wells 6. Half a dozen wells are bailing at the close of the week.

As a result of the new production, the estimated gross daily average for the week is placed at 73,710 bbls. compared with 71,140 bbls. last week. The estimated gross daily average for the Southwest fields is placed at 44,760 bbls., compared with 46,930 bbls. last week. The decline is in the new wells in Jim Hogg County.

That district is handicapped by a lack of pipe line facilities and a more extensive market for the product. There is very little incentive for any extended development work in either Jim Hogg or Webb Counties until the market for the crude is broader and prices higher. Experience has demonstrated these pools are limited in area, stretching along the escarpment for a distance of 17 miles. The Magnolia Petroleum Co. is the only one of the major companies doing any drilling in either county. It has gathering lines in the pools and a gravity line to Mirando City on the Tex-Mex railway, with storage tanks there. The Texpata Pipe Line Co. has about the same equipment, both companies having laid 6-inch lines to the development in Jim Hogg County. The product is shipped out in tank cars. The largest buyers are the Sun Oil Co. on a contract and the Swiftsure Petroleum Co. (Mills Bennett and associates), who ship to the terminals at Texas City, barging from Aransas Pass. O. W. Killiam, who opened the Mirando Pool, is trying to secure capital to lay an 8-inch line eastward to Aransas Pass, near Corpus Christi.

Many of the wells in Jim Hogg County are shut in waiting for the installation of gas separators. Recently the Plateau Oil Co. and the Texas Pacific Coal & Oil Co. entered Jim Hogg County and are drilling jointly.

Estimated Production

The following is the estimated daily average gross production for each pool, ending February 21:

District—	Gross Bbls.
Batson	1,520
Blue Ridge	725
Barber Hill	110
Big Creek	550
Dayton	50
Damon Mound	1,250
Edgerly (La.)	675
Goose Creek	8,855
Humble	5,130
Hull	15,300
Jennings (La.)	750
Markham	100
Orange	11,000
Pierce Junction	1,170
Spindletop	980
Saratoga	1,505
Sour Lake	3,975
Vinton (La.)	5,650
Welsh-Anse La Bute (La.)	70
West Columbia	12,300
Lockport (La.) two wells	625
South Liberty, two wells	1,200
Miscellaneous	300
Total	73,710
Southwest Fields—	
Luling	28,450
Laredo districts	4,130
Somerset	2,580
Callihan	350
Rockdale-Minerva	450
Jim Hogg County	8,800
Total	44,760
Grand total for week	118,470
Grand total last week	118,070
Increase	400

Limits Grade B Purchases

The Sun Pipe Line Co. announces: "Owing to the limited facilities for handling two grades of oil, only limited amounts of Grade B can be purchased in any field. These amounts to be determined by the ability of this company to handle and market the same."

The company also announces the following concerning the light gravity crude in some parts of the Humble Pool: "Humble light oil having a Baume gravity of 35 or above at 60 degrees Fahrenheit, is to be paid for at the same price per barrel as Grade A oil in that field." The Texas Co. is the only other buyer in the Humble Pool. It makes no distinction, grading all classes of oil as A. The Sun Oil Co. posts $1.20 for High Island crude, the last previous quotation being 85 cents. The same company runs the small production in the Dayton Pool, grading it as B at $1.75.

South Liberty Completion

The feature of the week as far as field work is concerned is Mills Bennett's No. 1-B Pickett, offsetting the discovery well on the southeast in the South Liberty Pool. It came in Friday night, flowing 800 bbls. and is expected to do better when it clears itself. Forty feet of 4½-inch screen was set at 3,316 feet in 28 feet of sand. The discovery well is in 12 feet of sand at 3,420 feet and it will be noted that the Bennett well got the pay 104 feet higher. The discovery well, known as the Pickett Oil Co.'s No. 1 Pickett, came in New Year's day and is still flowing 450 bbls. with the wash pipe and drill stem in the hole. It never did put out as much oil as the Bennett well is doing.

The next completion should be the Oxford Oil Co.'s No. 1 Harrison, southeast of the Bennett, which is now drilling below 3,320 feet. Bennett's No. 2 Pickett is below 3,000 feet and No. 3 at 2,600 feet with No. 4 rigging. His No. 1 Rivere is also rigging. The Humble Oil & Refining Co.'s No. 1-B Rivere is at 2,109 feet and No. 1 Chambers at 1,919 feet, with No. 1 Pickett at 2,000 feet. The Vacuum Oil Co.'s No. 1 Barrett is at 2,576 feet and No. 2 at 1,345 feet with No. 1 Rivere rigging. The Monarch Oil & Refining Co.'s No. 1 Harrison at 1,655 feet. No. 2 is rigging. The Oxford Oil Co.'s (T. H. Bass and associates) No. 2 Harrison is rigging. The Bashara Oil Co.'s No. 1 E. Pickett is at 2,980 feet with locations for Nos. 2, 3 and 4. The Hofer Oil Co.'s No. 1 is at 2,615 feet. The Esperson Oil Co.'s No. 1 Baldwin is at 545 feet. F. M. Long is rigging No. 1 Andrews. The Gulf Production Co.'s No. 1 Van de Venter is at 2,655 feet. No. 1 Mecom-Speer is rigging. The Texas Co. is rigging No. 1 and the Sun Co. No. 1 Shade.

Citizens Anticipate Boom

As was told when the district was opened, the acreage is cut up into small tracts from 1 to 10 acres close in to the wells and some 50-acre tracts far out. Under such conditions it would be impossible to enforce the rule of the Oil and Gas Division of the State Railroad Commission and therefore locations are close to the lease lines. The development is on the Trinity River bottom lands with numerous sloughs. It is 3 miles south of the town of Liberty, the county seat. Citizens see a "boom" ahead and plans for new business blocks have been drawn. The Southern Pacific railroad will erect a new and more commodious freight depot to take care of oil well supplies. The Swiftsure Petroleum Co. (Bennett and others) has about completed the 6-inch pipe line to Barber Hill and is building steel storage in the field. The Humble Pipe Line Co. and Sun Oil Co. are both extending their lines southward from Hull. The cost of drilling a well is estimated at $22,000. The owners of the discovery well are furnishing fuel oil at $2.25 per barrel, which is considered very reasonable and is done to encourage development work.

In the Orange Pool

In the Orange Pool, the Mutual Oil Co.'s No. 14 Chesson is flowing 2,300 bbls at 4,700 feet, 20 per cent water. The same company's No. 8 Peveto is good for 1,200 bbls at 4,600 feet. Its No. 3 Hager-Moore is pumping 50 bbls. at 3,550 feet. The Orange Petroleum Co. No. 8 Chesson bailed saltwater at 4,250 feet. The Supreme Oil Co.'s No. 1 Jackson did the same at 4,250 feet. The Rycade Petroleum Co. abandoned No. 14 State Land at 4,475 feet.

The Rycade's No. 2-C. is at 3,365 feet and No. 5-A at 3,255 feet, milling. The Brownie Babbittee Oil Co.'s No. 4 McLean is at 4,790 feet. The Tillery Oil Co.'s No. 1 State Land is at 3,990 feet. The Sun Oil Co.'s No. 3 Brown is working over at 4,365 feet. No. 6 Gunstream is at 4,565 feet. The Edgerly Petroleum Co.'s No. 3 Carbello is at 4,675 feet. The Atlantic Oil Producing Co.'s No. 3 Moore is sidetracking. The Mutual Oil Co.'s No. 4 Chesson is at 3,340 feet. No. 7 at 4,480 feet with a derrick for No. 14.

The Humble Oil & Refining Co.'s No. 9-B. Chesson is at 2,435 feet. No. 21 is at 4,845 feet. The Gulf Production Co.'s No. 2 Consolidated is deepening at 5,100 feet. No. 17 Hager fee is at 3,765 feet. No. 4-A Chesson is at 2,980 feet. Nos. 2 and 1 M. Granger are rigging and No. 4 Hager-Moore is preparing to drill deeper.

Hull Pool Completions

The Republic Production-Houston Oil Co. jointly got a bunch of nice wells on the Dolbear 800-acre lease in the Hull Pool. No. 100 is flowing 425 bbls. at 2,290 feet and No. 101 is heading 75 bbls. at 2,415 feet. No. 102 will make a pumper. No. 56, a workover, is bailing at 2,540 feet. The Gulf Production Co.'s No. 14 Scarborough is a 100-bbl. producer at 3,550 feet. No. 16 Hannah on the west side of the dome was abandoned at 3,150 feet. The Eagle Point Oil Co. abandoned No. 2 fee at 2,970 feet.

The Republic-Houston Oil Co. is working over No. 8 Dolbear and drilling No. 103 at 1,995 feet. The Gulf Production Co.'s No. 14 and 30 Phoenix are both deepening. No. 46 is around 3,050 feet and No. 47 at 1,775 feet. No. 12 Baldwin is at 1,025 feet. No. 20 Morris-Phillips is at 1,780 feet. No. 15 Scarborough is at 3,560 feet. The Humble Oil & Refining Co.'s No. 1 Merchant is drilling at 4,000 feet and No. 10 Guedry at 3,123 feet. The Higgins Oil & Fuel Co.'s No. 4 Taylor is drilling at 3,120 feet. The Yount-Lee Oil Co.'s No. 6 Stengler is at 3,035 feet. The Texas Co.'s No. 1 Hannah is at 1,245 feet and No. 2 is rigging. The Empire Gas & Fuel Co. has a fishing job in No. 13 Berrgrover. The Houston Production Co.'s No. 8 Taylor is at 2,235 feet and No. 9 is rigging No. 11 is working over.

In the Goose Creek Pool, the Gulf Production Co.'s No. 17 State Land in the bay is flowing 600 bbls., 50 per cent water, at 3,311 feet. The same company is bailing Nos. 15-A. Tabb and 3 Paddock at 2,650 and 1,600 feet respectively. The Humble Oil & Refining Co.'s No. 60 Smith is bailing at 4,200 feet. The following completions will pump: The Gulf Coast Oil Co.'s No. 31 Galliard at 2,900 feet; Sun Oil Co.'s No. 5 Wright at 2,500 feet and Copeland Oil Co.'s No. 5 Bryan at 3,250 feet.

The Gulf Production Co.'s No. 18-J. Galliard is at 4,235 feet. No. 6-Houston Smith is idle. No. 1-A. Hirach is at 4,485 feet. No. 4-A. Wright at 2,710 feet. No. 2 Busch is rigging to deepen, as is No. 10-C. Galliard and 30 Beaumont. The Humble Oil & Refining Co.'s No. 1 Hogg Island, is at 2,655 feet. No. 61 Smith is rigging. The Inca Production Co.'s No. 2 Duke is drilling around 2,600 feet. The Southern Exploration Co.'s No. 2 Wright is at 2,565 feet, No. 9 at 1,655 feet and No. 10 at 986 feet. The Hisgen Petroleum Co.'s No. 2 Busch is at 4,655 feet.

Hardin County Pools

In the Batson Pool, the Ada Belle Oil Co.'s No. 82 Condon is a saltwater hole at 1,175 feet. The Paraffine Oil Co.'s No. 38 fee is bailing at 720 feet.

The Gulf Production Co.'s No. 102 Wing is idle at 650 feet. S. R. Buchanan is drilling No. 81 Milbome at 700 feet. The Acorn Oil Co. is starting No. 53 Paraffine.

In the Saratoga Pool, the Gulf Production Co.'s No. 23 BBBC is pumping 35 bbls. at 875 feet. The Regna Oil Co.'s No. 1 Petty and Skinner Oil Co.'s No. 1 Hooks are both saltwater wells at 1,200 feet and 875 feet, respectively.

The Sun Oil Co.'s No. 58 Texas Crude is at 980 feet. The Rio Bravo Oil Co.'s No. 3 Bryant is at 2,466 feet. Pazzi Brothers' No. 6 Lewis is idle.

In the Sour Lake Pool, The Texas Co.'s No. 281 fee is pumping 15 bbls. after a workover. The Gilbert Oil Co.'s No. 95 fee is making 10 bbls. at 550 feet. T. G. Barkley's No. 1 Bashara is a 5-bbl. well at 655 feet and the Yount-Lee Oil Co.'s No. 1 Gilbert started off at 500 bbls. at 3,520 feet.

The Gilbert Oil Co.'s No. 96 fee is drilling at 440 feet. M. E. Peveto's No. 9 fee is at 565 feet. The Yount-Lee Oil Co. is rigging Nos. 1 Linn and1 Jackson The Sun Oil Co.'s No. 61 B. & R. is at 1,015 feet. The Gulf Production Co.'s No. 27 Tarver-Hardin is sidetracking.

In Other Pools

In the West Columbia Pool, the Humble Oil & Refining Co.'s No. 14 Pipkin-Lee is making 10 bbls. at 675 feet with No. 15 bailing at 670 feet. A location has been made for No. 16. No. 2 Wilson is rigging. The Hyde Production Co.'s No. 8 McGregor is drilling at 675 feet with No. 1 rigging for a workover.

In the Spindletop Pool, the McKinney Oil Co.'s No. 1 Gladys is pumping 45 bbls. at 850 feet and the Stella Oil Co.'s No. 6 McFadden 40 bbls. at 975 feet. The Williams Oil Co.'s No. 1 Gladys is a saltwater well at 1,120 feet. The Gulf Production Co.'s No. 211 Gladys is bailing at 850 feet.

Pierce Junction

At Pierce Junction the Gulf Production Co.'s No. 11 Taylor is flowing 225 bbls. by heads at 3,775 feet, 20 per cent water. It is an old hole drilled deeper. The Snowden and McSweeney Co. is working over No. 8 Cain and the Texas Exploration Co. is doing the same with No. 7 Dooley. Both are old holes.

At Blue Ridge, the Gulf Production Co.'s No. 7 Luscher is making 125 bbls.

(Continued on Page 186)

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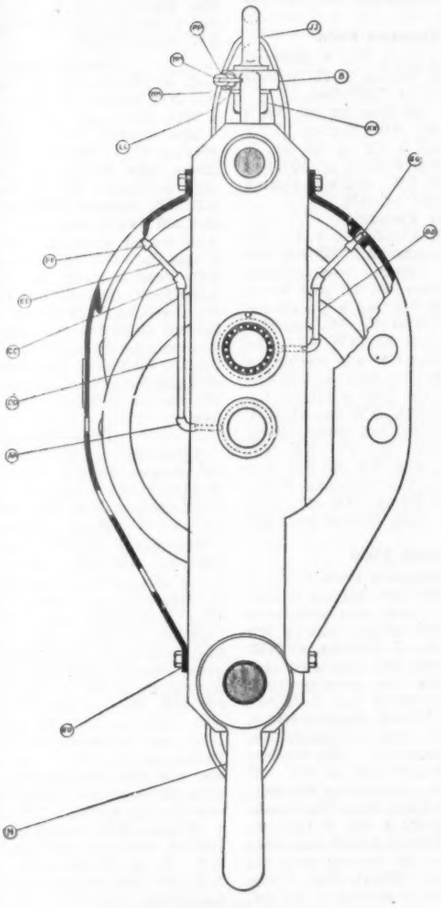

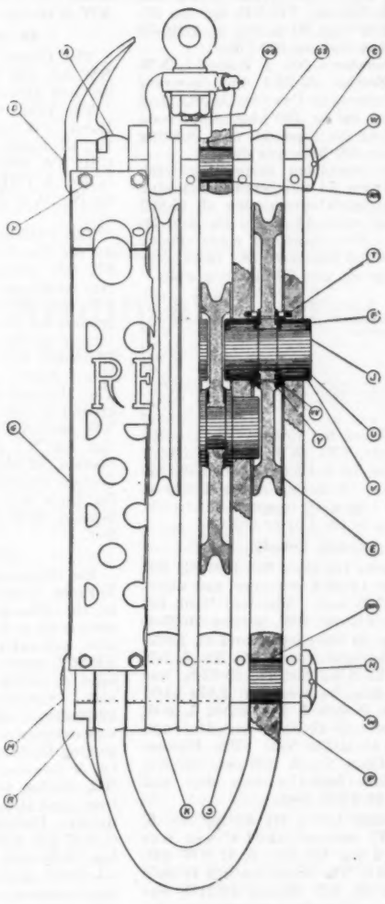

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Oklahoma Field Operations

By C. D. Lockwood

Magnolia Petroleum Co. gets 500-bbl. well in Davenport Pool. Josey Oil Co. completes 700-bbl. producer in Payne County, which started at 50 bbls. an hour. Old well deepened in Garber Field producing at rate of 850 bbls. of 47.5 gravity oil. Kay County well good for 700 bbls.

The Davenport Field, in Lincoln County, is again a center of interest, a 500-bbl. well having been completed there during the latter part of the week. Payne County also has a new well making more than 700 bbls. a day, while two wells in Garfield County were attracting attention. In the Hubbard Pool, in Kay County, operations were speeded up when the Marland Oil Co. had a well which, though making about 870 bbls. water, produced 840 bbls. of oil the first day.

The Magnolia Petroleum Co.'s No. 1 Sukovaty, SW cor. NW NE, Section 3-14-5, east of the town of Davenport, Lincoln County, is making the future of eastern Lincoln County look very promising. It topped a sand at 3,397 feet, and at 3,425 feet made a flow, and another flow occurred at 3,432 feet. At 3,352 feet the well was making 175 bbls. a day, and, deepened 1 foot further, flowed 500 bbls. the first 24 hours.

The Josey Oil Co.'s No. 5 Laughlin, SW cor. SE, Section 35-19-5, in Payne County, found the top of the lime at 3,250 feet, and got sand at 3,331-36 feet, where it started making 50 bbls. an hour. Three days after drilling in, it was making 732 bbls. of 44 gravity oil with no water.

The Marland Oil Co.'s No. 1 Fitzgerald, SE cor. NW NE, Section 1-26-2w, in Kay County, was making 700 bbls. from sand at 2,542-50 feet, with about 8 per cent b.s. Other wells in the field will deepen to get production from this sand.

Old Well Makes 850 Bbls.

In Garfield County, the Roxana Petroleum Corp.'s No. 8 Schroeder, NW cor. SW, Section 18-22-3w, an old well deepened in the Garber Field, started off at the rate of 40 bbls. an hour from sand at 2,328-35 feet, and was deepened 3 feet. On Sunday it was producing at the rate of 850 bbls. of 47.5 gravity oil. The Sinclair Oil & Gas Co.'s No. 2 Hartley, SW cor. NW, Section 18-22-3w, topped sand at 2,324 feet, and at 2,331 feet was making 185 bbls. a day.

Fuhrman & Shaffer's No. 1 Samuel, C SE NW NW, Section 22-10-9, in Okfuskee County, was making 150 bbls. of oil from sand at 3,380-3,400 feet, when water drowned the well. It has such high gas pressure, and flowing at the rate of 50,000,000 feet a day, that plugging can not be accomplished at the present time.

In the Maramec Field, in Pawnee County, the Westerly Oil Co.'s No. 1-A Smith, SW cor. Section 22-20-6, was making 15 bbls. an hour from sand at 3,043-3,111 feet.

The Shaffer Oil & Refining Co.'s No. 1 Coleman, SW cor. SE, Section 27-16-12, Okfuskee County, was making 4,000,000 feet of gas and syraying oil. This well is a north extension of the Sheldon Pool, and the first well in Section 27. The same company had a 200-bbl. show in sand at 3,019-25 feet in No. 3 Gibson, NW cor. SE SE, Section 17-15-11.

The H. F. Wilcox Oil & Gas Co. had a hole full of water at 3,690 feet in No. 1 Rhoda, NE cor. NW, Section 32-11-7, Okfuskee County.

In the Cromwell Field, Seminole County, the Cosden Oil & Gas Co.'s No. 8, NW cor. SW, Section 4-10-8, was making 400 bbls. from sand at 3,428-40 feet.

The Roxana Petroleum Corp.'s No. 1, NE cor. SW, Section 32-8-8, in the Wewoka Field, was drilling at 3,555 feet, and had no sand. The Prairie Oil & Gas Co.'s No. 3, SE cor. NE NE, Section 31-8-8, was shot with 60 quarts at 4,010-50 feet, and was making 400 bbls.

J. L. Donahoe's No. 1 Zoldoski, NW cor. SE, Section 22-23-4, the discovery well at Masham, in Pawnee County, had been holding up to 400 bbls. since soon after drilling in, and is now making slightly over 200 bbls. per day.

Oil wells completed during the week ended February 14 numbered 50, making a combined initial production of 18,899 bbls. There were 11 gas wells, and 30 dry holes. New locations made during the same period numbered 56; there were 229 new rigs up, and 796 drilling wells.

Field—	Wells	Prod.
Cromwell	288	39,144
Papoose-Glicrease	113	37,691
South Weleetka	20	3,338
Wewoka	109	11,081
Burbank	1,669	56,965
Stroud	69	2,843
Tonkawa	751	94,570
Tonkawa (deep sand only)	83	75,047
Braman	7	2,366
Otoe	12	8,732

Two wells of the Comar Oil Co., No. 7-A Clements, CSL NW, Section 34-25-1w, and No. 18-A Clements, C SW NE NW, Section 34-25-1w, in the Tonkawa Field, were last week reported incorrectly as belonging to the Carter Oil Co.

Osage County

The Douglas Oil Co.'s No. 1, C SE NE SE, Section 12-24-4, was dry and abandoned at 3,700 feet. The Red Bank Oil Co.'s No. 1, SE cor. SW, Section 20-23-8, was making 25 bbls. from sand at 2,922-30 feet. The same company's No. 3, NE cor. SE NE NW, Section 29-23-8, was making 60 bbls. from sand at 2,874-2,903 feet. Titus, Norris & Bird's No. 1, NW cor. Section 25-21-10, was dry and abandoned at 2,020 feet. The Pioneer Petroleum Co.'s No. 6, NE cor. SE NE SW, Section 5-20-11, was dry and abandoned at 1,797 feet.

C. B. Peters had a rig up for No. 5, C NE NW, Section 32-24-9, and was moving in a rig for No. 2, C SW SE, Section 4-23-9. The Sand Springs Home's No. 1, NW cor. SE, Section 15-21-9, was spudding in. The same owner's No. 84, NW cor. NE NW SE, Section 24-21-9, was drilling at 1,200 feet. The Tidal Oil Co. was rigging up No. 6, NW cor. NE NW, Section 31-21-12. The Winona Oil Co. had a rig up for No. 20, CSL SW SW NE, Section 9-20-12.

New and drilling operations in the Burbank Field include Phillips Petroleum's No. 7, C NW SE NE, Section 11-27-5, rigging up; same company's No. 10, C SE NW NE, Section 11-27-5, rig up; Skelly Oil Co.'s No. 2, CSL SE SW SW, Section 2-27-5, drilling at 690 feet; Phillips Petroleum Co.'s No. 5, CWL NW SW SW, Section 12-27-5, rig up; No. 6, C NE SW SW, rig up; No. 7, C NW SE SW, rigging up; No. 9, CWL SW NW SW, building rig; No. 10, C SE NW SW, spudding in; No. 11, C SW NE SW, spudding in; No. 11, C SW NE SW, spudding in; No. 13, NW cor. NW SW, spudding at 250 feet; No. 14, CNL NE NW SW, drilling at 450 feet; No. 15, CNL NW NE SW, drilling at 340 feet; No. 16, NE cor. SW, drilling at 475 feet; Carter Oil Co.'s No. 10, CEL SE NE NE, Section 13-27-5, drilling at 275 feet; The Texas Co.'s No. 11, CNL NW NE NW, Section 18-27-6, building rig; No. 12, C SW NE NW, building rig; No. 13, CWL SW NW NW, rig up; No. 14, C SE NW NW, rig up.

In the Tonkawa Field

The Carter Oil Co.'s No. 8 Stewart, NW cor. SW NW, Section 35-25-1w, was dry and abandoned at 3,220 feet.

The Texas Co. was cleaning out No. 4 Davis, SW cor. SE SW, Section 27-25-1w, to deepen; had a rig up for No. 5, CSL SW SW; was drilling at 300 feet in No. 8, CSL SE SW, and was rigging up No. 9, C N half SE SW.

Kay County

The Prairie Oil & Gas Co. had a rig up for No. 3 Vanatta "A," SE cor. SE SE SE, Section 1-26-2w, was building rigs for No. 4, SE cor. SE SE, and No. 5, SW cor. NW SW SE, had a rig on the ground for No. 1, NW cor. SE, and was rigging up No. 2, NE cor. NW SE. The Blackwell Oil & Gas Co. was rigging up No. 1 Raney, NW cor. Section 7-26-1w. The Marland Oil Co. had a rig on the ground for No. 4 North, NW cor. SE NW NE, Section 12-26-2w, and was building rigs for No. 5, NE cor. NW NE NE, Section 12-26-2w, and No. 6, NE cor. Section 12-26-2w. The Champlin Refining Co.'s No. 1-A Burch, NE cor. SW, Section 21-24-1w, was drilling at 2,355 feet.

Cromwell Field

The Roxana Petroleum Corp.'s No. 2 Yarhola, C SW NE SW, Section 3-10-8, in the Cromwell Field, was completed with sand at 3,336-3,449 feet, making 920 bbls. naturally; No. 5 Yarhola, C NW NE SW, same section, was completed with sand at 3,358-3,434 feet, making 2,070 bbls. The Cosden Oil & Gas Co.'s No. 12 Toney, C SE SW SW, Section 4-10-8, was completed with sand at 3,420-46 feet, making 60 bbls. naturally. The Sinclair Oil & Gas Co.'s No. 3 Clark, C SW NE NE, Section 4-10-8, was making 400 bbls. from sand at 3,396-3,444 feet. The Southwestern Petroleum Co.'s No. 6 Jackson, C NW NE NW, Section 4-10-8, was making 10,000,000 feet of gas and spraying oil from sand at 3,324-71 feet. The same company's No. 5 Wisner, C NE SE NE, Section 4-10-8, was making 900 bbls. from sand at 3,386-3,473 feet. The Roxana Petroleum Corp.'s No. 2 Curley, C SE NW SW, Section 14-10-8, was making 270 bbls. from sand at 3,508-50 feet.

The Mutual Oil Corp. was spudding in No. 5 Pierce, C SW NW SE, Section 33-11-8, rigging up No. 6 Pierce, C SE NW SE, and had rigs up for No. 7 Pierce, C NE NE SE, and No. 8 Pierce, C NW NW NW. The Pulaski Oil Co. and the Carter Oil Co. had a rig up for No. 2 Williams, C SE SE NW, Section 33-11-8. The Carter Oil Co.'s No. 5 Dunn, C SE SW NW, Section 3-10-8, was drilling at 500 feet; the same company's No. 8 Dunn, C NE NW NW, was rigging up. The Roxana Petroleum Corp. had a rig up for No. 6 Yarhola, C NE NE SW, Section 3-10-8. The Southwestern Petroleum Corp.'s No. 6-A Wisner, C NW SE NE, Section 4-10-8, was drilling at 650 feet. The Sinclair Oil & Gas Co.'s No. 1-A Fixico, C SE NE SE, Section 5-10-8, was spudding in, and is a twin to No. 1, same location, which was lost at 3,400 feet. The same company had a rig on the ground for No. 4 Fixico, C SW NE SE, Section 5-10-8. The Tidal Oil Co. and the Carter Oil Co.'s No. 1 King, C SW SW NW, Section 14-10-8, was spudding in.

Pawnee County

The Watchorn Oil & Gas Co.'s No. 4 Diamond, C NW NE NW, Section 4-22-3, Pawnee County, was making 550 bbls. from sand at 4,100-38 feet. Adamson and others' No. 1-A Sigan, SE cor. NW SW, Section 32-21-8, was making 40 bbls. from sand at 2,860-88 feet.

The Amerada Petroleum Corp. was spudding in No. 1, C NE SW SE, Section 22-23-4. The Comar Oil Co. was spudding in No. 1 C NW SE SE, Section 22-23-4, and was running 15-inch to a water sand at 820-840 feet. Donahoe and others' No. 2, C NE NW SE, Section 22-23-4, was drilling at 450 feet. The same owners' No. 7, C SE NW SE, Setcion 22-23-4, was spudding at 220 feet. The Magnolia Petroleum Co.'s No. 7 Diamond, C SW NW NW, Section 4-22-3, was a crooked hole at 225 feet. The Watchorn Oil & Gas Co. was building a rig for No. 12 Miller, C NE SE SW, Section 33-23-3.

Garfield County

C. E. Knox's No. 3 Coker, CEL NE NE NE, Section 26-22-4w, was pumping 4 bbls. from sand at 1,186-1,200 feet.

The Sinclair Oil & Gas Co.'s No. 16 Belveal, CNL NE SW NE, Section 24-22-4w, was drilling at 2,200 feet. The same company's No. 24 Belveal, SE cor. NE NE, Section 24-22-4w, was drilling at 2,220 feet in sand topped at 2,218 feet with no oil showing. The Sinclair Oil & Gas Co.'s No. 18 Walker, SE cor. NE NE, Section 13-22-4w, was drilling at 1,100 feet. The Sinclair Oil & Gas Co.'s No. 14 Kisner, NW cor. NE NW SE, Section 19-22-3w, was rigging up. The same company's No. 1 Burns, C NE SE, Section 30-22-3w, was fishing for a bit at 3,020 feet; No. 2 Burns, NW cor. NE SE, Section 30-22-3w, was drilling at 830 feet.

Payne County

The Josey Oil Co.'s No. 3 Lee, SW cor. SE, Section 35-19-5, Payne County, was drilling at 3,474 feet in sand topped at 3,472 feet, making 152 bbls.

Creek County

The Savoy Oil Co.'s No. 4 Johnson, NE cor. SW NE, Section 23-17-8, in Creek County, was completed with sand at 2,664-89 feet, making 39 bbls. a day after a 30-quart shot. The Lima Oil Co.'s No. 3 Green, NW cor. Section 24-17-8, was making 20 bbls. after an 80-quart shot at 2,268-2,315 feet. The Carter Oil Co.'s No. 1 Hamilton, SW cor. SE NW, Section 32-17-8, was completed with sand at 3,530-53 feet, making 25 bbls. after a 10-quart shot. The Olean Petroleum Co.'s No. 7 Washington, NW cor. SW SW, Section 32-17-8, was shot with 120 quarts at 3,482-3,517 feet, and was making 400 bbls. T. B. Slick's No. 1 Wisner, SW cor. NW NW, Section 10-15-9, was dry and abandoned at 2,220 feet. E. L. Kistler's No. 2 Scott, CNL NW SW NW, Section 21-14-10, was completed for 3,000,000 feet of gas from sand at 602-25 feet. F. R. Billingslea and the Skelly Oil Co.'s No. 1-A Lucas, NW cor. NE NE, Section 31-15-9, was dry and abandoned at 1,275 feet.

O. M. Ireland was rigging up a machine for No. 1 Vann, SE cor. SW SW, Section 4-17-11. R. T. Wright spudded in and shut down No. 1 Gwinn, NW cor. SE, Section 15-17-10. O. P. Oliver's No. 1 Dickson, NE cor. SW, Section 19-17-10, was drilling at 400 feet. The Prairie Oil & Gas Co.'s No. 7 Sheals, C SE SE NE, Section 33-16-9, was drilling at 350 feet. The Twin State Oil Co.'s No. 2 Brady, C SE SW NW, Section 34-16-9, was drilling at 300 feet. The Olean Petroleum Co.'s No. 2 Yarhola, NE cor. SE SE, Section 31-17-8, was drilling at 350 feet. The Jomac Oil Co. had a rig up for No. 2 Timothy, NW cor. NE NE, Section 1-16-8. The Prairie Oil & Gas Co. was building a rig for No. 9 Pitman, C SE NW NW, Section 5-16-8. The Olean Petroleum Co.'s No. 4 Wills, NW cor. NE NE, Section 6-16-8, was drilling at 450 feet. The Phillips Petroleum Co.'s No. 1 Wattie, NW cor. NE, Section 31-15-8, was rigging up. Lewis Emery and

Sons' No. 7 Pounds, NE cor. SE NW, Section 2-14-8, was rigging up. The Prairie Oil & Gas Co. was rigging up No. 7 Kernal, SW cor. NE SE, Section 30-14-8. The Pure Oil Co.'s No. 3 Kernal, SE cor. NE, Section 30-14-8, was drilling at 625 feet. C. G. Tibbens was spudding in No. 1 Coon, NE cor. SE NE, Section 23-14-9. The Phillips Petroleum Co.'s No. 2 McIntosh, NW cor. SW, NE, Section 24-14-9, was drilling at 200 feet. F. R. Billingslea had a rig up for No. 3, NE cor. Section 28-14-9. The Atlantic Oil Producing Co. was spudding in No. 3 Nevvins, CSL SW SE, Section 17-14-10. The H. F. Wilcox Oil & Gas Co.'s No. 5 Scott, C SE SW NE, Section 20-14-10, was drilling at 300 feet. The Waite Phillips Co. was spudding in No. 3 Hill, CNL NW SE, Section 6-16-9. The Wolfe Oil Co. was spudding in No. 2 McTurnham, CWL SE NE, Section 6-16-9. The Phillips Petroleum Co.'s No. 19-A Tiger, NE cor. NW SW, Section 4-15-9, was drilling at 500 feet. F. R. Billingslea and the Skelly Oil Co. were rigging up No. 3 Fields, NW cor. SE SW, Section 30-15-9. C. G. Tibbens had a rig up for No. 8, SW cor. NE SW, Section 30-15-9. The same owner's No. 1 Lucas, NW cor. SW NE, Section 31-15-9, was drilling at 300 feet.

Lincoln County

The Cosden Oil & Gas Co.'s No. 1 Castleman, SW cor. Section 13-15-6, in Lincoln County, was drilling at 325 feet.

Okfuskee County

The Windsor Oil Co.'s No. 3 Holmes, SW cor. NE, Section 22-11-11, in Okfuskee County, was making 150 bbls. naturally from sand at 2,573-88 feet. The Gladys Belle Oil Co.'s No. 8 Holmes, CEL SE SE, Section 13-11-11, was shut in for 12,000,000 feet of gas in sand at 2,840-43 feet. The Tidal-Osage Oil Co.'s No. 1, C NW SW SW, Section 2-11-11, had a hole full of oil from sand at 2,599-2,610 feet.

C. W. Wangerine's No. 1 Pitman, SW cor. NE, Section 36-12-9, was dry and abandoned at 4,085 feet. The Atlantic Oil Producing Co.'s No. 2 Fisher, C SE NW SE, Section 36-12-10, was shot with 40 quarts at 3,050-62 feet, and made 25 bbls. in 24 hours cleaning out. The Anglo Tex Oil Co.'s No. 1 Skelton, SW cor. SE SE, Section 33-12-11, was dry and abandoned at 2,792 feet.

The Waite Phillips Co. had a rig on the ground for No. 1 Prince, C SW SE NE, Section 6-11-8. The Independent Oil & Gas Co.'s No. 1 Scott, SW cor. SE SW, Section 33-13-7, was spudding in. The Cosden Oil & Gas Co. had a rig up for No. 1 Richardson, C SE SE NE, Section 17-10-9.

Okmulgee County

The Shaffer Oil & Refining Co.'s No. 3 Carolina, C NW SE SE, Section 17-15-11, in Okmulgee County, had a 20-bbl. show in sand at 2,615-44 feet. The Gates Oil Co. and the Cook Drilling Co.'s No. 1 Carolina, C NE NE SW, Section 3-15-12, was dry and abandoned at 2,705 feet. Meadows & O'Brien's No. 1 Morey, SW cor. NW NE, Section 34-16-12, was completed for 50 bbls. naturally with sand at 2,159-90 feet. Houston & Sheldon's No. 3 Vore, CEL NE NW, Section 34-16-12, was completed with sand at 2,168-78 feet, making 960 bbls. naturally.

The Magnolia Petroleum Co. was rigging up No. 1 Kanard, SE cor. SW SW, Section 28-13-12. Kellogg had a rig up for No. 2 Barnett, CSL SW SE, Section 29-15-11. The Holly Oil Co. was building a rig for No. 1 Morton, C SE SE NE, Section 32-13-12. The Waite Phillips Co.'s No. 1 Kanard, C SW SW NW, Section 33-13-12, was drilling at 1,290 feet, and making 6,000,000 feet of gas from sand at 700 feet. The Holly Oil Co. had a rig up for No. 2 Webster, C NE SW NW, Section 33-13-12. The Eagle Picher Lead Co. had a rig up for No. 3 Webster, CEL NW NW, Section 33-13-12. The Superior Oil Corp. and others were spudding in No. 5 Morey, SE cor. SW NE, Section 34-16-12. The Sheldon Oil Co. had a rig on the ground for No. 2 Vore, CNL NE NE SW, Section 34-16-12. The Superior Oil Corp. was rigging up No. 3 Vore, SE cor. SW SE NW, Section 34-16-9. Roy Poe and others had a rig on the ground for No. 1 Vore, SE cor. SW NW, Section 34-16-12. The Oklahoma Eastern Oil Co. had a rig up for No. 10 Tiger, CEL SW SW, Section 24-16-12. Houston & Sheldon had a rig on the ground for No. 4 Vore, NE cor. NW, Section 34-16-12. The Superior Oil Corp. and others were spudding in No. 3 Vore, CSL NW, Section 34-16-12, and had a rig up for No. 4 Vore, SW cor. SE NW, Section 34-16-12. The Hope Oil Corp. was spudding in No. 2 Vore, NW cor. NE SW, Section 34-16-12, and was building a rig for No. 3, NE cor. NW SW, Section 34-16-12. Sheridan & Turner were spudding in No. 2-A, SW cor. SE, Section 35-16-12.

Muskogee County

W. B. Pine's No. 1-A Barnett, SE cor. NE NE, Section 24-16-15, in Muskogee County, was drilling at 1,250 feet.

In the Papoose Field

T. B. Slick and others' No. 4 Sands, C SE SW SE, Section 35-10-9, was making 400 bbls. from sand at 3,350-61 feet. The Indian Territory Illuminating Oil Co. and the Barnsdall Oil Co.'s No. 3 Williams, C NE SW SW, Section 34-10-9, was completed with sand at 3,305-17 feet, making 1,800 bbls. The same companies' No. 4 Williams, C NW SE SE, Section 34-10-9, topped sand at 3,296 feet, and had oil from 3,300 feet to 3,307 feet, where it was making 15 bbls. per hour with a small amount of water. T. B. Slick's No. 3 Sands, C SW SE SE, Section 35-10-9, was completed with sand at 3,345-66 feet, making 170 bbls. daily. The same owner's No. 4 Sands, SE cor. SW SE, Section 35-10-9, was making 200 bbls. from sand at 3,348-57 feet. The Independent Oil & Gas Co.'s No. 2 Bruner, C SW NW NW, Section 1-9-9, topped sand at 3,340 feet, and got oil from 3,365-95 feet, where it was making 50,000,000 feet of gas and 350 bbls. of oil. The same company's No. 4, C SE NW NE, Section 2-9-9, was completed with sand at 3,330-43 feet, making 450 bbls. per day. The Indepnedent Oil & Gas Co.'s No. 4 Alexander, C SW NE NE, Section 2-9-9, was making 500 bbls. from sand at 3,337-53 feet. T. B. Slick's No. 3 Alexander, C NW NE NW, Section 2-9-9, was making 300 bbls. from sand at 3,325-37 feet. The same owner's No. 4 Grayson, C SE SE NE, Section 3-9-9, was making 600 bbls. from sand at 3,289-3,305 feet.

New and drilling operations include Independent Oil & Gas Co.'s No. 8 S. Alexander, C SE SE NE, Section 2-9-9, rig on ground; same company's No. 8 I. Alexander, C SW SW NE, Section 2-9-9, building rig; Minnehoma Oil Co.'s No. 1 Cain, C SW NW NE, Section 1-9-9, rig on ground; Indian Territory Illuminating Oil Co. and Barnsdall Oil Corp.'s No. 1 Anderson, C NW NW SW, Section 1-9-9, building rig; Lou Umburn's No. 1-A Barnett, C NW NW SE, Section 35-10-9, spudding in; Independent Oil & Gas Co.'s No. 6 Alexander, C NE SE NE, Section 2-9-9, spudding in; same company's No. 1 Carolina, C NE NE SE, Section 2-9-9, drilling at 350 feet; Cosden Oil & Gas Co.'s No. 3 Alexander, C SW SE NW, Section 3-9-9, spudding in; Phillips Petroleum Co.'s No. 3 Arber, C SW NE SE, Section 3-9-9, drilling at 800 feet; T. B. Slick's No. 6 Grayson, C SE NW SE, Section 3-9-9, drilling at 550 feet.

Seminole County

W. R. Ramsey's No. 2 McGeisey, C SE SW SW, Section 19-8-8, in Seminole County, was drilling at 1,700 feet. The Prairie Oil & Gas Co. had a rig up for No. 1 Bowlegs, C NE NE SW, Section 31-8-8, and was building a rig for No. 3 Salinda, C SW SW NE, Section 31-8-8. W. R. Ramsey had a rig up for No. 2 Salinda, C NW NW SE, Section 31-8-8; the same owner's No. 2 Bowlegs, C SE SW NW, Section 31-8-8, was drilling at 900 feet.

Tulsa County

Hall and others' No. 1 Marshall, SW cor. Section 27-19-14, in Tulsa County, was dry and abandoned at 1,379 feet. T. B. Slick and others' No. 1 McIntosh, CNL NW NW NE, Section 12-17-14, was dry and abandoned at 2,110 feet.

The Laurel Oil & Gas Co.'s No. 1-A, SW cor. NE SW, Section 4-18-13, was drilling at 850 feet. Black, Sivalls & Bryson's No. 7 Rentie, CNL NW SE NW, Section 16-18-13, was drilling at 500 feet. W. H. Meisner and others' No. 2 McIntosh, SW cor. NW, Section 2-18-14, was drilling at 450 feet. The Sinclair Oil & Gas Co.'s No. 1 Johnson, SW cor. NW, Section 5-18-14, encountered a dry sand at 1,894-1,920 feet, and was drilling at 2,060 feet. The Sterling Oil & Gas Co.'s No. 4, SW cor. NW SW NW, Section 1-18-12, was drilling at 1,900 feet. Thompson & Black's No. 1-A Wetstone, SW cor. SE, Section 3-16-12, was drilling at 450 feet. The Lewis Oil Co. and others' No. 1 Berryhill, NE cor. SE SW, Section 1-17-14, was drilling at 1,307 feet. Thompson & Black's No. 1 Bartholf, CNL NW NW, Section 8-16-13, was drilling at 350 feet. Winemiller and others' No. 3 Brown, CWL SW SW, Section 18-16-13, was drilling at 1,050 feet. The Riverland Oil Co.'s No. 1 Grayson, SE cor. NE NE, Section 15-16-12, was drilling at 600 feet.

Wagoner County

E. K. Moss' No. 1 Taylor, NW cor. Section 5-17-16, in Wagoner County, was dry and abandoned at 1,335 feet. J. E. Martin's No. 1 McIntosh, NW cor. SW SW, Section 2-17-16, an old gas well, was drilled to 1,148 feet and abandoned.

Sewell and others had a machine on the ground for No. 1 Conrad, NW cor. SE SE, Section 17-17-16. Sloman & Evans' No. 1 Murphy, SE cor. SW NE, Section 18-17-16, was drilling at 960 feet. The Kanola Oil Co. was spudding in No. 4 Colbert, C NE SW, Section 4-16-15. J. M. Pennington's No. 4-A McHenry, SW cor. NE SW, Section 29-18-15, was drilling at 855 feet. J. W. Bowles' No. 1 Charles, NW cor. NE SW, Section 26-18-16, was drilling at 450 feet.

Carter County

The Humble Oil & Refining Co.'s No. 1 Hales, C NE NE SE, Section 28-1s-3w, Carter County, was making 170 bbls. from sands at 3,280-85 feet and 3,300-23 feet. The Healdton Petroleum Co.'s No. 2 Bogle, C NE NE SE, Section 6-3s-2w, was making 100 bbls. naturally from sand at 2,808-31 feet. The Amerada Petroleum Corp.'s No. 18 Farve, C NW SE NE, Section 20-5s-1, was completed with sand at 1,268-1,300 feet, total depth 1,609 feet, making 70 bbls. daily. The same company's No. 5 Clay, C SW NW NE, Section 28-5s-1, was completed with sand at 914-23 feet, making 100 bbls.

Simpson & Fell were spudding in No. 1 Ashton, C SW SW NW, Section 27-1s-3w. The Magnolia Petroleum Co.'s No. 3 Hart, C NE SW NE, Section 32-1-s-3w, was drilling at 345 feet. Westheimer & Daube's No. 1 Hart, C SW NE NE, Section 32-1s-3w, was drilling at 1,900 feet. The Schermerhorn Oil Co. and Young were rigging up a rotary for No. 9 Sparks, CSL SW SW, Section 30-2s-2w. The Sprague Oil Co. had a rig up for No. 5 Bennett, CSL NW SE NW, Section 31-2s-2w. The Magnolia Petroleum Co. had a rig up for No. 14 Bennett, CWL NW NW, Section 31-2s-2w, and for No. 6 Nelson, C NW NW NW, Section 25-2s-3w. The Schermerhorn Oil Co.'s No. 2 McGill, C SW NE SE, was

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Rocky Mountain Area

By Frank B. Taylor

CASPER, Wyo., Feb. 21.—The Teapot Dome trial, to be held in Cheyenne on March 9, is attracting the attention of the oil fraternity in the Rocky Mountain region. This trial is an effort on the part of the Government to annul the lease granted by Secretary of the Interior Fall to the Mammoth Oil Co., covering the Teapot Dome area, a part of the Salt Creek Field.

The lease was granted April 7, 1922, and contained rather stiff terms that were carried out by the Mammoth Oil Co. until the appointment of a receiver by the Federal Court, took the operation out of the hands of the Mammoth Oil Co.

In this trial, the Government will try to show fraud in the obtaining of the lease by the Sinclair interests. The Government attorneys, Owen J. Roberts and Atlee Pomerene, will endeavor to connect the Continental Trading Co., Ltd., of Canada, with the case.

While the main object of the Government is to cancel the Mammoth lease, the oil men of the Rocky Mountain region look upon the whole trial with trepidation for it is feared that in case the trial should be decided in favor of the Government, the whole petroleum industry might become the plaything of the politicians and demagogues who would use it to further their private ends. This spirit is already prevalent in Wyoming for a members of the Wyoming Legislature is credited with the statement that it is his wish to see the Wyoming oil industry saddled with all the taxes of the State and let the rest of the taxpayers of this commonwealth be relieved of all taxes.

Another phase mentioned frequently in connection with this trial is that no Federal titles could be considered safe if an ironclad lease like the Mammoth's should be cancelled. Most of the oil operations of this region are upon Government owned lands and the leases in every case are made upon terms that are partial to the Government, more so than leases obtained from private ownership.

Salt Creek High School

The new high school for students in the Salt Creek Field has been completed and the building was dedicated at Midwest the past week with a large number of Casper people and Midwest Refining Co. officials present. The school has been named the Ellison school, in honor of R. S. Ellison, vice president of the Midwest.

A merger of the Marine, Glenrock and other smaller companies interested in leases and production in the Salt Creek Field is reported to be taking place in New York. Max W. Ball, head of the Marine is in New York on business connected with the merger.

Field Reports

The Kinney Coastal well on Section 19-39-78 is having trouble with water and had to run another string of pipe. This last string brings the hole down to 3-inch. The depth is 3,793 feet and waiting for cement to set on the inside string.

The Lakota test of the Mutual Oil Co. on Section 2-39-79 is drilling at 2,385 feet and expects to have the sand in two or three weeks. The Midwest deep test on Section 23-40-79 is trying to drill by the oil and gas, but the pressure causes trouble. This well has been mudded off several times and comes back after every trial with enough pressure to blow out the mud. The depth is 2,600 feet. The Midwest deep test on Section 35-40-79 is at 2,380 feet and also having some trouble with the oil and gas found in the Dakota found at 2,268 feet. This well is making about 3,000 bbls. daily.

The Salt Creek Consolidated Oil Co., drilling on Section 7-39-78, found a producer good for 63 bbls. at 2,185 feet after a shot. This well was a shale producer for some time past and has been drilled down.

The Mutual Oil Co., drilling on Section 26-36-65 in the Lance Creek Field has a producer although not yet completed. The hole is at 3,718 feet and is carrying about 2,500 feet of oil in the hole.

The Montana Oil Co., drilling on the Bowes structure, in Blaine County, Montana, drilled in a 30,000,000-foot gasser on Section 4-32-19 at a depth of 1,075 feet. Opinion appears to be divided on the strike, some considering that it will not last while others think the well opens a new gas field.

The deep test of the Potlatch Oil Co. in the Sunburst Field, at present shut down for the winter, at 4,350 feet is to start work again in the near future. This deep hole is the first of its kind to be put down in the field.

The Hatfield Oil Co.'s No. 2 on the Eight-Mile Lake Dome in Carbon County, Wyoming, is waiting for cement to set at

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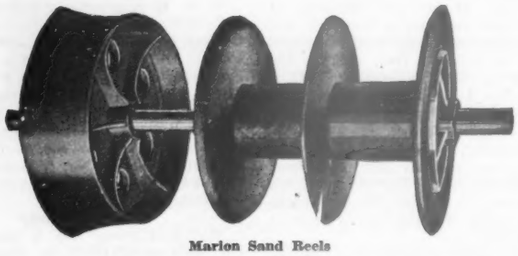

Marion Sand Reels

Marion Standard Iron Sand Reels

The Marion Line of Sand Reels are built to meet the requirements of the different oil fields. There are three sizes of bevel pulleys and one straight faced pulley, 32-inch and 36-inch end flanges are flanged over on edge to stiffen them. The 40-inch flanges are made of heavy plate.

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When putting capital into oil well equipment it is a big satisfaction to know that one is not experimenting. Nearly a quarter century in the successful manufacture of oil well supplies have enabled us to anticipate the needs of the oil men. Scientific construction and high-grade material and thorough understanding of the oil problems is back of every piece of Marion Line Oil Well Machinery.

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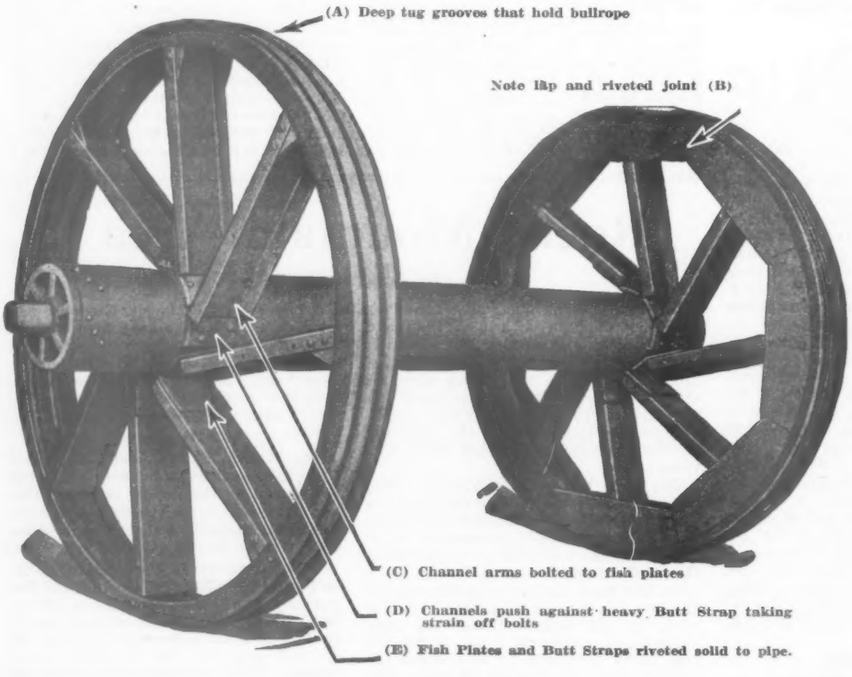
- ☐ No. 206 Marion Sand Proof Working Barrel
- ☐ No. 214 Marion Hi-Test Sucker Rods

Marion HI-TEST Sucker Rods

(Name Registered)

Marion Hi-Test Sucker Rods are made of special analysis steel having a very high maximum tensile strength. The ends are upset, resulting in one piece solid construction, making the rod absolutely weldless. Special threading machines thread the box and pin in perfect alignment with the body of rod. Special forging processes and features give unusual strength to these rods. They are made strongest where the greatest strain comes and will not break under the stress that snaps the regular steel or wrought iron sucker rods.
Write for Bulletin No. 214.


(A) Deep tug grooves that hold bullrope
Note lap and riveted joint (B)
(C) Channel arms bolted to fish plates
(D) Channels push against heavy Butt Strap taking strain off bolts
(E) Fish Plates and Butt Straps riveted solid to pipe.

Marion Line of Oil Well Equipment

Tubular Steel Derricks
Wood Derricks
Rig Irons
Sand Reels
Pulling Machines
Steel Bull Wheels
Steel Band Wheels
Steel Calf Wheels
Steel Tug Rims
Steel Pony Wheels
Band Wheel Powers
Gas Engines
Plain and Reversible Clutches

Marion HI-TEST Sucker Rod

Marion Steel Bull Wheels

The Marion Steel Bull Wheel has many improvements that add greatly to the use of the steel bull wheel. It is made up of three sections. The shaft, tug wheel and brake wheel.

The shaft is so constructed that the arms bolt on to the hub plates and the thrust is against the shoulder plates which are firmly riveted to the shaft. The load is removed from the bolts.

Any pair of wheels and any shaft will go together.

Marion Steel Tug Rims

The tug rim is one-piece steel plate, rolled into the grooved rim without any joints. The grooves are smooth and even. The shape of the groove grips the rope firmly without clinging. The elimination of bad joints and this firm grip, not allowing slipping means long life for the bull rope.

The arms bolt on to hub plates and the thrust is against the shoulder plates which are firmly riveted to the shaft. Since there is no load on the bolts, Marion Steel Bull Wheels stand the most severe shocks.

The gudgeons are made of semi-steel and have great strength. They are riveted to the shafts with eighteen rivets each, insuring tight gudgeons.

Marion Steel Tug Rim

FOR YOUR CONVENIENCE FACTORY BRANCHES ARE MAINTAINED AT THE FOLLOWING PLACES:

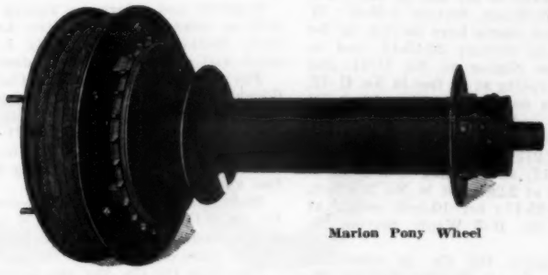
El Dorado, Ark.	Breckenridge, Tex.
Eureka, Kans.	Burkburnett, Tex.
Scottdale, Pa.	Mexia, Tex.
Tulsa, Okla.	Luling, Tex.
Drumright, Okla.	Casper, Wyo.
Bristow, Okla.	Salt Creek, Wyo.
Okmulgee, Okla.	Wilson, Okla.
Tonkawa, Okla.	Olney, Tex.
Nowata, Okla.	Houston, Tex.

Export Office, 136 Liberty St., New York, N. Y.

Oil Well Machinery

"We consider your Powers superior to any now on the market. If there ever was a power that is perfectly constructed it is your No. 2424 Under Pull All Steel 24-foot, 24-inch throw Marion Band Wheel Power. If you have prospects for your power and they need evidence, take them over our various leases and we are certain they will decide on the Marion."

(Extract of letter from a user of Marion Line Oil Well Equipment.)



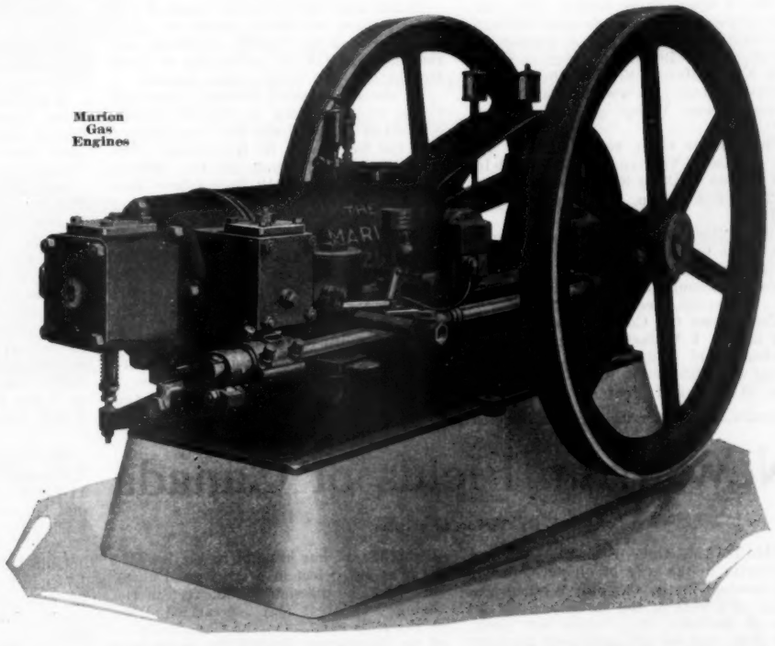
Marion Pony Wheel

Marion Steel Pony Wheel

Marion Pony Wheel in Oklahoma Pattern. Shaft 13 inches in diameter by 7 feet long. Sprocket Wheel has 28 teeth and faced with a quarter inch steel plate and is furnished with Pony Wheel.

Marion Line of Oil Well Equipment

Hi-Test Sucker Rods
Forged Steel Sucker Rods
Gas Pumps
Pull Rods
Sand Proof Working Barrels
Marion O. K. Jacks
Spooling Flanges
Marion Idlers
Marion Pumpers
Oil Tanks
Belting and all Surface Equipment



Marion Gas Engines

Marion Gas Engine Performance

"We have five Marion 25 H. P. Gas Engines as well as other makes and we consider the Marion in a class by itself; one of the Marion Engines ran a hundred ninety-two days and nights, without stopping, which we consider an excellent recommendation." The above is an extract from a letter in our files. We have many such letters testifying to the merits of the Marion Gas Engine, built especially for Oil Country Service.

Marion Gas Engines, 10-25-35-H. P.

The Marion Gas Engine is particularly suited for hard service in the oil country.
Careful attention has been given to the water space in the cylinder, cylinder head and exhaust chamber is much larger than the usual space
The additional water holds the water temperatures much lower and retards the formation of scale, thereby keeping the water jackets open. Catalog No. 70 gives full information about the Marion Line of Gas Engines.

Marion Steel Calf Wheel

Marion Steel Calf Wheels

Marion Steel Calf Wheels have the same rugged construction characteristics of the other Marion Line oil well machinery. The gudgeons are riveted. The hub construction is the same as bull wheel. The shaft is fitted with cast iron stiffeners which prevent pipe from crushing under heavy load. They are built in sizes to suit the required work.

Marion Machine, Foundry and Supply Company

Marion, Indiana

THE MARION LINE

N. LOUISIANA-ARKANSAS

(Continued from Page 40)

standard rig with 1,000 feet of oil and 40 feet of sand in the hole at 1,984 feet in No. 4 Williams, Section 3-16-15; H. L. Hunt and others have derrick up for No. C-10 in Section 26-15-17, and in same section rigging up No. C-11, and set 10-inch casing at 61 feet in No. C-12, and waiting on standard rig with 1,500 feet of oil and 19 feet of sand in the hole at 2,340 feet in No. C-13; set 6-inch casing at 2,277 feet in No. 1 Riley, Section 22-15-17, and drilling it in; set 6-inch casing at 2,281 feet in No. 3 Street, Section 26-15-17; set 10-inch casing at 63 feet in No. B-5 Wyatt, Section 26-15-17.

The Invaders Oil Co. is rebuilding derrick for No. 2 Hardin, Section 22-15-16; J. K. Hughes is arranging to drill deeper from 2,015 feet; No. 2 Reeves, Section 28-15-16; Kelly and others have derrick up for No. 1 Wells, Section 23-15-17.

D. N. Johnston is arranging to drill deeper from 2,064 feet in No. 2 Hicks, Section 27-15-16; J. W. Kind is drilling sand at 2,316 feet in No. 2 Jackson, Section 27-15-16; Lee, trustee, has derrick up for No. 2 Smith, Section 26-15-17; Leon and others are drilling No. 2 Berg, Section 4-16-15, at 1,223 feet.

Magnolia Petroleum Co. is bailing casing at 2,282 feet in No. 1 Bettie Clawson, Section 35-15-17; McCorkle and others are rigging up No. A-2 Smith, Section 25-15-17; Murdock and others have derrick up for Nos. 1 and 2 Riley, Section 22-15-17.

The Penguin Oil Co. is cementing a short string of 4½-inch casing at 2,234 feet in No. 1 Hardin, Section 27-15-16; J. D. Reynolds set 10-inch casing at 56 feet in No. 5 Ward, Section 25-15-17; Riggs and others are waiting on standard rig with 1,000 feet of oil and 33 feet of sand at 2,358 feet in No. 2 Green, Section 23-15-17; and derrick up for No. 1 Hildreth, Section 22-15-17.

J. S. Smith is rigging up No. C-1, Section 35-15-17. This was formerly A-3. The Sun Oil Co. set 6-inch casing at 2,187 feet in No. 4 Hardin, Section 27-15-16.

The Sure Oil Co. is drilling gumbo at 935 feet in No. 1 Snyder, Section 34-15-15.

The Texas Co. is waiting on standard rig with 250 feet of oil and 19 feet of sand at 1,994 feet in No. 7 Berry, Section 33-15-15; derrick up for No. 8 Berry, same section; Timberlake and others are rigging up No. 2 Green and set 10-inch casing at 80 feet in No. 3 Green, both in Section 23-15-17; Whittaker and others set 10-inch casing at 61 feet in No. 2 Green, Section 23-15-17.

Whittiken and others are drilling No. 2 Hodges at 1,675 feet Section 26-15-17; White and others are rigging up No. 1 Riley, Section 23-15-17; Sid Umsted is drilling No. 1 Jones, Section 26-14-17, at 1,765 feet; Unity Petroleum Co. set 10-inch casing at 58 feet in No. 3 Berry, Section 33-15-15.

Drilling Operations

Webster Parish

The Crusaders Oil Producers Co. has undertaken an extensive drilling campaign in the Cotton Valley district and now has eight rigs running on the Hope Estate and derricks up or building for eight more. The leases lie in Sections 13, 24, Township 21, Range 10, in the heart of the producing district.

The Alabama Petroleum Co. is drilling at 700 feet in No. 1 Coffee, Section 19-21-9, on the eastern edge of the field.

Derryberry and others are drilling at 560 feet in Smith A-1, Section 29-21-10, in the southwest corner of the field.

The Fortuna Oil Co. has derrick up for No. 1 R. R. Cox, Section 15-21-10; Humble Oil Co. is arranging to pump Bodcau B-12, Section 24-21-10, drilling at 300 feet in B-13, Section 28-21-10, and in B-14, Section 13-21-10, and has derricks up for B.-15 and B-17, Section 28 and for B-16, Section 24-21-10, with location made for Bodcau C-1, Section 13-21-10. Derrick is up for No. 3 Gray, Section 26-21-10., No. 2 standing with 1,600 feet of oil in the hole at 2,550 feet and arranging to pump. No. 4 S. S. Merritt, Section 14-21-10, is also arranging to pump at 2,572 feet and No. 1 J. Moore, Section 34-21-10, is drilling at 2,560 feet.

Kennedy and others are rigging up to drill an interesting test on the Ambrose land, Section 19-20-10, nearly 5 miles south and a little west of production.

The Louisiana Oil Refining Corp. set 6-inch at 2,795 feet in No. 1 Bodcau and has derrick up for No. 2, Section 13-21-10; No. 2 Gray, Section 28-21-10, is drilling in chalk rock at 2,025 feet and in same section No. 3 is drilling at 400 feet and No. 4 at 350 feet.

Moffatt and Murphy have derrick up for No. 3 Coyle, Section 28-21-10 and set 6-inch casing at 2,525 feet in No. 1 Miller, same section.

The Ohio Oil Co. has two more wells ready to pump on the Bodcau lease, Section 13-21-10, drilling at 2,100 feet in No. 19, Section 15-21-10, and at 700 feet in No. 21, Section 27-21-10; set 10-inch at 450 feet in No. 22, Section 27-21-10; rigging up to drill No. 1 Cox, Section 15-21-10; tested dry at 2,570 feet in No. 1 Gray, Section 27-21-10; and tested salt water with a little oil at 2,562 feet in No. 2 Gray, same section, with derrick up for No. 3 Gray, Section 26-21-10, and location made for No. 4, Section 27.

Palmer and Blount are rigging up to drill No. 1 Mason, Section 20-18-10, an interesting test just west of Doyline, between Cotton Valley and Elm Grove districts.

The Palmer Corp. set 10-inch at 422 feet in No. 2 Tillman, Section 28-21-10, and Ruston Drilling Syndicate set 6-inch at 2,475 feet in No. 1 Cox, Section 15-21-10.

In the Springhill district, in the north end of the parish, the Oil Fields Gas Co. is rigging up to drill two more wells; No. 2 Jordan-Young, Section 34-23-10, and No. 1 Simpson, Section 3-22-10.

The Simms Oil Co. is drilling at 210 feet in No. 1 Walker, Section 28-23-10; Louisiana Oil Refining Corp. set 6-inch casing at 2,795 feet in No. 1 Armor, Section 21-23-9, and Fortuna Oil Co. set 6-inch casing at 2,582 feet in No. 1 Nickerson, Section 33-23-10, and is drilling at 2,340 feet in No. 1 Pine Woods Lumber Co., Section 27-23-10.

Bienville Parish

The Roxana Petroleum Corp. ran a core barrel in No. 1 Bryan, Section 30-17-6, showing salt water sand at 2,776 feet. The test is 8 miles south of Gibsland and Arcadia.

Bossier Parish

In the north end of the parish, in the Springhill district, Arkansas Natural Gas Co. set 6-inch casing at 2,625 feet in No. 1 Bolinger, Section 32-23-11.

In the Elm Grove district, the Palmer Corp. is drilling at 1,315 feet in Hodges B.-8, Section 25-16-12.

Thigpen & Herold set 6-inch casing at 1,905 feet in No. 1 Bernstein, Section 11-20-13, 4 miles northeast of Benton.

In the Bellevue Field, the Dixie Oil Co. is rigging up to drill No. 1 Johnson, Section 34-19-11, and G. W. Weatherbee set 6-inch casing at 340 feet in Bliss and Weatherbee S-4, Section 23-19-11. Osborne and others tested salt water and will abandon No. 1 McDade, Section 28-19-11, at 595 feet.

Caddo Parish

In the west end of the old Caddo Field, W. D. Chew set 6-inch casing at 1,815 feet in No. 3 fee, Section 27-21-16, and the Standard Oil Co. is drilling at 1,850 feet in No. 170 Stnes, same section.

In the Pine Island district, Dixie Oil Co. is bailing casing in Noel B-1, Section 24-21-15, at 3,454 feet and drilling at 1,100 feet in No. 65 Robertshaw, Section 13-21-15; Fortuna Oil Co. drilling at 3,255 feet in No. 10 Robertshaw, Section 23-21-15; Ohio Oil Co. is rigging up to drill No. 16 E. K. Smith, Section 7-21-14; The Texas Co.'s 6-inch casing collapsed at 3,009 feet in its deep test, No. 3 Caddo Mineral Land Co., Section 23-21-15, and Tholl Oil Co. is arranging to pump No. 9 Bashara, Section 23-21-15, at 1,635 feet.

In the south end of the parish, in the Waskom district, Ford and others are bailing to test at 1,915 feet in No. 1 Agurs, Section 15-17-16, and Glassell and Myers are drilling at 650 feet in No. 2 Florsheim, Section 9-17-16. A. C. Scott and others are drilling at 80 feet in No. 1 Stringfellow, Section 19-17-16, and Waterman Drilling & Development Co. arranging to resure drilling at 978 feet in No. 1 Hunting Club,, Section 17-17-16.

Flournoy, trustee, set 10-inch casing at 200 feet in No. 1 Simpson, Section 8-16-15, 7 miles northeast of Bethany. Between Greenwood and Bethany, Proven Production Co. is drilling at 2,040 feet in No. 1 Agurs, Section 6-16-16.

In the Caddo Lake district, W. M. Gross and others set 6-inch casing at 1,860 feet in No. 2 H. Rives and others, Section 5-20-16, and Gulf Refining Co. is arranging to pump No. 221 Ferry Lake, Section 21-20-16.

Haynes Brothers set 8-inch casing at 2,200 feet in No. 1 Louisiana Live Stock & Plant Co., Section 8-19-16, 6 miles southwest of Mooringsport.

In the south end of the Elm Grove gas district, The Texas Co. set 10-inch casing at 1,123 feet for a deep test in No. 3 Huron Land Co., Section 8-15-12.

Caldwell Parish

Culver and others are drilling at 3,300 feet in No. 1 fee, Section 21-14-4, 5 miles north of Columbia.

Claiborne Parish

In the old Homer Field, the Block Oil & Gas Co. is drilling at 500 feet in No. 2 Aubry, Section 20-21-8.

A majority of the drilling wells in Claiborne Parish are wildcat tests around Homer and Arcadia. A promising oil sand discovered at 2,805 feet in the Taylor well, drilled by J. P. Evans and others, has greatly increased the interest. The Taylor well is 12 miles southeast of Homer. During the week, the Triangle Drilling Co. made a location for No. 1 J. H. Cox, Section 7-19-5, southwest of the J. P. Evans test, and Woodley and Collins are building derrick for No. 1 Oakes in Section 8-20-5, 5 miles north.

The Claiborne-Lincoln Syndicate tested dry at 2,236 feet in No. 3 Fields, Section 22-19-5, 5 miles northeast of Arcadia, and Clark and Melat are drilling at 1,460 feet in No. 1 Heard, Section 5-21-6, 4 miles northeast of Homer.

De Soto Parish

The Greyhound Syndicate is drilling at 2,988 feet in No. 1 Pollock, Section 33-11-14; 4 miles south of the old Spider district and within 3 miles of the Sabine Parish line.

La Salle Parish

Gulf Refining Co. is drilling in rock at 1,745 feet in Urania A-1, Section 22-11-2e, and Urania Petroleum Co. is rigging up to drill Urania No. 6, Section 15-10-2e.

Morehouse Parish

The Natural Gas Producing Co. set 12½-inch casing at 180 feet in No. 15 Crossett, Section 20-22-5, and Oil Fields Exploration Co. is drilling at 2,170 feet in No. 1 R. Watson, Section 13-20-4.

Natchitoches Parish

R. O. Roy has a fishing job at 800 feet in No. 1 C. M. Durr, Section 27-10-10, about 10 miles south of the old Bull Bayou Field in Red River Parish.

Ouachita Parish

Montgomery and others are drilling in gumbo at 1,900 feet in No. 1 McHenry, Section 12-19-4; Southern Carbon Co. set 6-inch casing at 2,180 feet in No. 44 fee, Section 7-19-5, and drilling at 1,665 feet in No. 45 fee, Section 11-19-4; Standard Carbon Co. is drilling at 1,985 feet in No. 1 Swartz, Section 6-19-5, and J. P. White and others at 1,350 feet in No. 1 Jones, Section 2-14-10.

Red River Parish

Tarver and others are bailing 6-inch casing at 2,575 feet in No. 1 Jones, Section 2-14-10, south of Lake Bisteneau.

Sabine Parish

L. M. Emlet are drilling at 1,395 feet in No. 5 Bowman Hicks Lumber Co., Section 9-7-12, in the south end of the parish.

Union Parish

Simms Oil Co. tested salt water with no show of oil or gas at 2,115 feet in No. 1 James, Section 16-22-5, 8 miles south of Junction City.

Winn Parish

Galloway and Arrendale are drilling at

(Continued on Page 196)

News from Fields of Canada

By Victor Lauriston

CHATHAM, Ont., Feb. 21.—A novel enterprise in the way of oil development will proceed in the Candian West as the result of a vote of the ratepayers of the city of Medicine Hat, taken last week. The vote was on an agreement between the city and A. E. Roth of Independence, Kans., for the drilling in Medicine Hat gas field of a deep test for oil, to be carried to a depth of 3,200 feet. If the well is a commercial oil producer, the city receives any incidental gas without cost and turns over 8,000 acres of leases to Roth for further development, receiving a fixed royalty on this and any future oil production. If the well proves a gasser, or a dry hole, the city is to recoup Roth to the extent of $75,000 for his outlay, receiving in return the gas production, if any. As the proposed location is in the proven field, the test being designed to try out the formations underlying the Medicine Hat sand, the well is practically certain to be a commercial gasser in any event, and in addition to the chances of oil, may tap new gas sands underlying the present productive strata. Out of a total oil poll of 1,362, there were 989 votes for and 373 against the Roth proposal, every poll except the advance poll returning a majority favorable.

In southern Alberta, the Montana oil production has been brought considerably closer to the Alberta boundary by the drilling of a producer in the Albert Archambault test, 7 miles south and 4 miles west of Coutts, Alta., in Section 21-36-3. The well is reported good for 300 bbls. a day, production being encountered around 1,900-foot depth, between 400 and 500 feet deeper than the oil-bearing sands further south, indicating a pronounced dip of the producing sands near the Canadian border. Farther south the Queen City Oil Co. of Regina, Sask., has brought in No. 8 a producer at 1,410 feet in a stray sand above the Ellis, the oil rising 1,000 feet in the casing. The test may be carried down to the Ellis sand. On the Canadian side of the Sweetgrass district, the Gunn syndicate is being reorganized with the addition of some Ottawa capital, and acreage is being secured east of Coutts. East of Coutts Canadian Oil & Refining Co. (Rogers-Imperial) gasser on Section 29-1-11w4 recently blew open, the gas pressure forcing out the mud plug to shut it in when the well was being deepened. An Imperial Oil, Ltd., crew headed by W. Applegate succeeded in getting the gasser once more under control. The production will be piped to the Imperial No. 2 on Dead Horse Coulee before the latter resumes drilling in the spring.

Okotoks Field

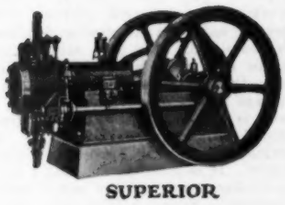
In the Okotoks Field, southwest of Calgary, the Royalite Oil Co. No. 4 is securing a steady daily production of 300 bbls. of light oil. The oil is extracted from the gas by means of drips inserted in the five pipe lines radiating for one-half mile from the well, the gas being burned at the outlet of each pipe as a precautionary measure. It is probable that additional drilling will be undertaken this season. Imperial Oil, Ltd., employes are reported to have filed on territory in the Jumping Pound area, 18 miles due west of Calgary, and it is unofficially reported that one new test will be drilled by the Royalite in this area and another in the Okotoks-Turner Valley Field northwest of the No. 4 gasser.

Control of the Canadian Western Natural Gas, Light, Heat & Power Co., which supplies Calgary, Lethbridge and other points in southern Alberta with gas from the Bow Island, Foremost and

(Continued on Page 187)

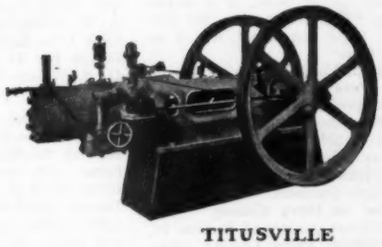
WICO

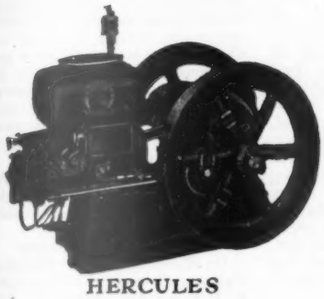
BESSEMER

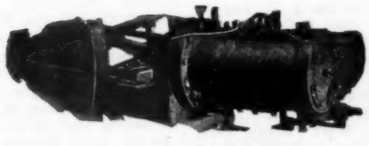

SUPERIOR

Standard Equipment on the Leaders

For more than fifteen years these engine builders and many others have had remarkable service from WICO Ignition, testified to by their adoption of it year after year as standard equipment.


TITUSVILLE


HERCULES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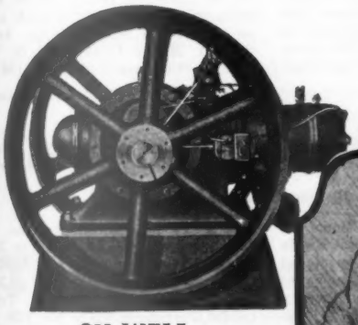
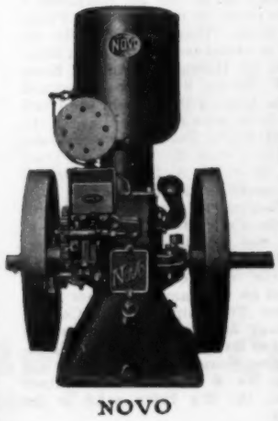
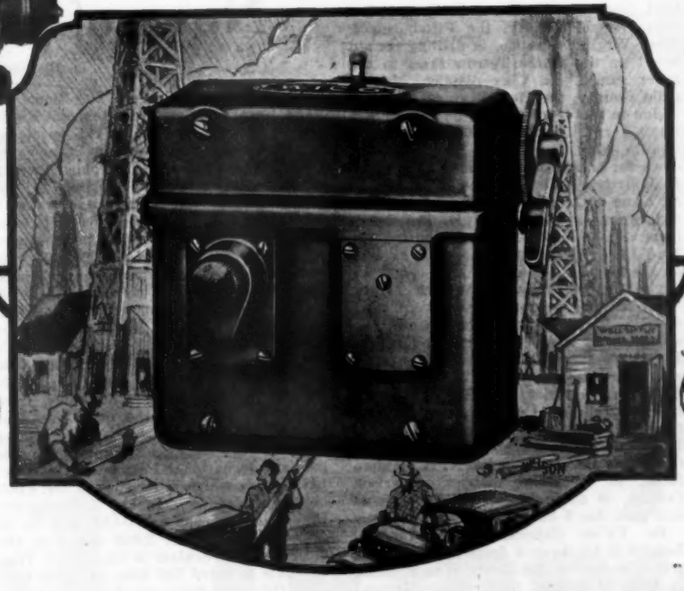

OIL WELL


NOVO



WICO ELECTRIC CO. SPRINGFIELD, MASS. U.S.A.

BRANCH AT TULSA

Pennsylvania-West Virginia

By D. S. Wakenight

Rush Creek Oil & Gas Co. gets best completion in deep sand, southeastern Ohio, Richland Township, Fairfield County, well making 25 bbls. Pure Oil Co. gets 30-bbl. producer in shallow sand, York Township, Morgan County. Manufacturers Light & Heat Co. has 12-bbl. well in Wetzel County, W. Va.

PITTSBURGH, Pa., Feb. 23.—Development work during the week proved unsatisfactory in both the number and size of wells completed. One deep sand and one shallow sand well in southeastern Ohio were the only ones completed above the average size in production. The deep sand well is the Rush Creek Oil & Gas Co.'s second test on the Folk heirs' farm, in Section 22, Richland Township, Fairfield County. It is good for 25 bbls. a day in the Clinton sand. In the same section and township, Sturm & Co.'s test on the Henry Christ farm, is a duster in all sands. This location is 600 feet west of the same company's No. 6 on the Morrow farm.

In Section 23, York Township, Morgan County, the Pure Oil Co. completed the shallow sand producer. It is this company's No. 6 on the William Epply farm and good for 30 bbls. a day in the Berea grit. Neither West Virginia or southwest Pennsylvania completed anything better than light pumpers.

Gasser in Perry County

In the southeast quarter of Section 10, Jackson Township, Perry County, Ohio, the Trinway Oil & Gas Co. completed a Berea grit gasser at its test on the Frank Metzgar farm. They will move the rig and start a second test on the same farm. In Section 13, Harrison Township, Knox County, F. Marion Snyder completed and shot in the Berea grit No. 9 on the Hugh L. Green farm good for 3 bbls. a day. In Section 22, Knox Township, Columbiana County, the Coraopolis Savings & Trust Co.'s No. 14 on the A. L. Stoffel farm is a light pumper in the Berea grit.

In Washington Township, Monroe County, the Carter Oil Co. rigged up at a second test on the Catherine Malone farm. In Pike Township, Coshocton County, the same company started to drill a test on the Samuel Gardner farm. In Newton Township, Licking County, F. M. Rugg & Co. are drilling on the J. I. Hughes farm. In Washington Township, Monroe County, the Carter Oil Co. is drilling No. 6 on the A. J. Watson farm from the Big Injun sand to the Berea grit.

In Section 33, Stock Township, Noble County, Ohio, Lee Timmerling and others completed a test on the Walter Johnson farm, a very light pumper in the Macksburg 700-foot sand. The same parties have completed a second test on the same farm good for 2 bbls. a day. Both wells are 2½ miles southwest of production on the E. F. Ball and S. W. Marsh heirs' farm.

In Athens Township, Athens County, Carter Oil Co. completed in the Berea grit a test on the C. O. Lowery farm. It is a natural producer good for 3 bbls. a day. In the same township unknown parties drilled a test on the Saylor farm through the Berea grit and scored a duster. They did not get a show of oil or gas in any formation.

Licking County

E. L. Edmonds & Co. completed in the Berea grit No. 3 on the Robert Stair farm, Newton Township, Licking County. It is good for 5 bbls. a day. In Lot 15, Madison Township, Spindler, Donaldson & Co. drilled a second test on the Morris E. Irwin farm through the Berea grit good for 5 bbls. a day.

West Virginia

The most important well in West Virginia, aside from the deep tests drilling was completed during the early part of last week on the middle fork of Poca River, Washington district, Jackson County. The Kentuck Oil & Gas Co. completed through the Big Injun sand its wildcat on the Joshua Skeen farm. It is a duster, 10 miles west of production in the Rock Creek Pool.

In Collins Settlement district, Lewis County, the Philadelphia Oil Co.'s test on the W. J. Wilson farm is a gasser in the fifth sand. In Union district, Ritchie County, C. B. Lewis & Co. completed a Big Injun sand gasser at a test on the A. W. Zichafoose farm. In Murphy district, Pope Brothers have a 5-bbl. pumper in the Big Injun sand at No. 3 on the H. S. Wilson farm.

Tests Drilling

On Laurel run, Murphy district, Ritchie County, E. E. Pope started to drill on the Robert E. and H. S. Wilson farm. On the south fork of Hughes River, Ruth & Strong are drilling on the Lemon heirs' farm. This well was formerly a light producer in the top of the salt sand. On Dutchman run, the Cairo Oil Co. started to drill down from the salt sand to No. 2 on the J. B. and A. W. Lemon farm. On Gillespie run, Grant district, the Continental Oil & Gas Co. is starting a second test on the W. A. Ridgeway farm. In Clay district, Parker & Smith shut down for gas on the D. T. Haymond heirs' farm.

In Reedy district, Wirt County, Godfrey L. Cabot is drilling at 2,000 feet on the J. W. Earfman farm. The Bates Oil & Gas Co. is drilling at 2,375 feet on the William Bates farm, in McClelland district, Doddridge County. In Church district, Wetzel County, the Pittsburgh & West Virginia Gas Co. is drilling its old No. 1 on the James Tetrow farm to the lower sands. In Clay district, Monongalia County, the Hope Natural Gas Co. is due in the Gordon sand on the Robert Davis farm. In Curry district, Putnam County, the Commercial Gas Co. shut down for casing on the James Bays farm. In Courthouse district, Lewis County, F. M. Kane & Co. are hauling rig timbers to a location on the Mary E. Daugherty farm. In Collins Settlement district, the Mud Lick Oil & Gas Co. started to drill on the Dennison heirs' farm.

Light Pumper in Wetzel

Three miles west of Pine Grove, Center district, Wetzel County, the Manufacturers Light & Heat Co. completed in the Big Injun sand No. 3 on the Evan Morgan farm and good for 12 bbls. a day. In Proctor district, the Hope Construction & Refining Co. completed a light Gordon sand gasser at a test on the Lemuel Goddard farm. The Delva-Tex Oil & Gas Co.'s test on the N. B. Lanhan farm, in Ten-Mile district, Harrison County, is through the Fifty-foot sand and good for 5 bbls. a day.

In Union district, Ritchie County, Louden & Co. have a duster in the Berea grit at a test on the James Wright farm. In Murphy district, the Carnegie Natural Gas Co. has drilled through the same formation on the Peter Wass farm and had the same luck. It will fill up to the Maxon sand and try for a gasser from that level. In Clay district, Ritchie County, the Carter Oil Co. is through the Big Injun sand at No. 5 on the J. S. Hamilton farm and dry. This location is close to the Tyler County line. On Mill run, DeKalb district, Gilmer County, the Hope Natural Gas Co. has a very light pumper in the Big Injun sand at a test on the W. G. Bennett farm. In Grant district, Pleasants County, E. A. Ryan has a very light pumper in the salt sand at his No. 10 on the T. C. Hammett farm.

Ritchie County Completions

In Clay district, Ritchie County, the Chalmers Oil Co.'s No. 15 on the Benjamin McGinnis farm is a 5-bbl. pumper in the Squaw sand. In Union district, C. C. Prunty has a gasser in the Big Injun sand on the Oakey Nutter farm. In Murphy district, Spearman & Co. are through the Berea grit on the William Reager farm with a light show of oil. It will be shot. In Grant district, the Hope Natural Gas Co.'s test on the Martha C. Lewis farm is showing light in the Maxon sand. It will be shot and tested. The same company's No. 3 on the Maxwell Brothers' farm is a gasser in the Big Injun sand. In Central district, Tyler County, the Carter Oil Co. has a duster in the Squaw sand at a test on the J. S. Hamilton farm. It will be abandoned. In Collins Settlement district, Lewis County, the West Fork Oil & Gas Co.'s test on the E. L. Haymond farm is a gasser in the Gantz sand.

In Liberty district, Marshall County, the Manufacturers Light & Heat Co. completed a gasser in the Gordon sand at a second test on the T. C. Pipes farm. In the same district, the Carnegie Natural Gas Co. drilled its second test on the L. E. Conaway farm deeper, a light pumper in the fourth sand. In Smithfield district, Roane County, the United Fuel Gas Co.'s test on the W. S. Simmons farm is a gasser in the Big Injun sand.

In Lubeck district, Wood County, George W. Stout & Co. completed a second test on the W. T. Munchmyer farm. It has a light show of oil in the Cow Run sand. The first test on this farm came in a 3-bbl. pumper; the owners had hopes of developing a new pool. The Hope Construction & Refining Co.'s test on the J. L. Hays farm in Mannington district, Marion County, is a gasser in the fifth sand.

Harrison County Tests

In Clay district, Harrison County, the Hope Natural Gas Co. started to drill a test on the E. M. Rose farm. In Coal township, the same company is drilling at 3,245 feet on the S. W. Green farm. In Troy district, Gilmer County, the Carter Oil Co. started to drill on the Icy M. Wilcox farm. The Hope Natural Gas Co. is drilling on the J. M. Rymer and Emma Goff farms, in Murphy district, Ritchie County. In Central district, Doddridge County, Nay & Williams are rigging up on the Luella Smith farm. In Courthouse district, Lewis County, T. M. Kane & Co. are hauling rig timbers to a location on the Mary E. Daugherty farm. In Collins Settlement district, the Mud Lick Oil & Gas Co. started to drill on the Dennison heirs' farm. In Southwest district, Doddridge County, Zinn & Broadwater are drilling a second test on the O. P. Scott farm. In Cove district, the Pittsburgh & West Virginia Gas Co. is drilling on the William Flesher farm. In DeKalb district, Gilmer County, J. N. Stephens & Co. placed rig material at a location on the P. A. Beall farm. In Center district, McCall & Co. started to drill on the Canzada Stump farm. The Richter Oil Co. made a location on the George W. Dye farm, in Sheridan district, Calhoun County.

Calhoun County

On Leading Creek, Sheridan district, Calhoun County, the Hope Construction & Refining Co. started to drill on the W. B. Richards farm. In the same district, the Richter Oil Co. made a location on the George W. Dye farm. In Walton district, Roane County, L. G. Young &

(Continued on Page 182)

News of Mexican Fields

By George Blardone

TAMPICO, Mex., Feb. 20.—Some 22 wells were completed in Mexican Fields the past week of which six can be placed in the production column with new potential production of 10,150 bbls. Twenty of these wells were completed in the northern fields, five being producers with new potential production of 9,650 bbls. and two were completed in the southern fields, one of which is a 10,000-bbl. fluid well, which should strip for 500 bbls. The net failures were, therefore, 16 wells.

The Cacalilao sector of the northern fields scored the best completions of the week, Transcontinental Petroleum Co.'s No. 145, Lot 4 there, being reckoned good for 5,000 bbls. at 1,775 feet. In Lot 5, its No. 136 is good for 300 bbls. from 2,250 feet, although the drill was sent to 2,400 feet in the hopes of increasing the pay. The next best completion in the list is International Petroleum Co.'s No. 147, Lot 5, which is rated good for 4,000 bbls. at 1,750 feet. In Lot 4, La Corona Petroleum Co., has a 250-bbl. well in its No. 164, finished at 2,040 feet. In the older Panuco, Schlaet & Co., No. 3 Vega de Otate is rated 100 bbls. at 2,190 feet.

In tht south fields, the Texas Co.'s No. 4, Lot 11 Tepetate, finished at a sub-sea level of 1,873 feet, a 10,000-bbl. fluid well, which will probably strip 500 bbls. In the same district, Norris and others' No. 1, Lot 161 Amatlan, is a salt water well at a subsea level of 1,612 feet.

The failures in the northern fields follow: In Cacalilao: International Petroleum Co.'s No. 104, Lot 5, drilled into salt water at 2,230 feet; Nos. 124 and 127, same lot, were dusters at 2,330 and 2,113 feet respectively; and Nos. 137 and 142, same lot, were also dry at 2,500 and 2,422 feet, respectively. Transcontinental Petroleum Co.'s No. 159, Lot 4 is a duster at 2,130 feet. In Lot 2 its No. 147 drilled into salt water at 2,270 feet. In the older Panuco, Gilliam and others' No. 1, Lot 15 Lomas y Llanos drilled into salt water at 2,425 feet. Mexican Crude Oil Co.'s No. 4, same lot, did the same at 2,145 feet, and to continue the story, National Lines (Federal zone) No. 20 Raventadero is a salt water well at 1,878 feet. East Coast Oil Co.'s No. 506-A, Lot 29 Tamboyche (Topila), is salt water at 2,717 feet.

In Corcovado, Mexican Gulf Oil Co.'s Nos. 5 and 7, Lot 4 are both dusters at 2,600 and 2,475 feet, respectively. Power and others' No. 5 Garruche-Corcovado finished a duster at 2,400 feet. In the Ebano district, Mexican Petroleum Co.'s No. 49 La Dicha is a dry hole at 2,283 feet.

At Cacalilao

Drilling operations in the Cacalilao sector of the northern fields as the week ended are best reflected as follows: La Corona Petroleum Co., in Lot 4: Nos. 160 and 162 are in the San Felipe at 1,470 feet and in the white lime at 1,094 feet, respectively; No. 165 is fishing for tools at 1,180 feet; No. 166 is in shale at 900 feet, and No. 151, Lot 1, is in shale at 500 feet. In Lot 5, Interna-

(Continued on Page 182)

In all the Fields of South America

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Kentucky—Tennessee

By Vern T. Whitney

Dafoe and others complete two wells in new Tinsley's Bottom Pool, Clay County, Tennessee. Two amber oil wells in Gorby Pool, Barren County, Porter and others' doing 40 bbls. and Lewis Emery & Sons' 110. Victor De Caigny has 20 bbls. in Roedemer Pool; Union Gas & Oil 60 and 40-bbl. completions.

BOWLING GREEN, Ky., Feb. 23.—While little new work has yet been started in the Kentucky fields most operators seem to feel the industry is in a better technical position than since 1920, and that there is real reason to believe this year will be a profitable one. With oil in this section now at the present mark much new work will undoubtedly be undertaken and it will not be surprising to see a number of wildcats started in various counties after the operators have convinced themselves the recent crude advances are likely to be permanent and not short-lived as was the case for the three preceding springs. When the stability of the crude price structure appears well established there is no question a large amount of new work will be started.

There are many hundreds of square miles of potential oil territory in Kentucky and Tennessee and higher prices will bring about a renewal of wildcat work. Nearly every substantial operator has some pet spot picked out he has made up his mind to test as soon as possible and it is probable some of these tests will open new pools.

It is now established that production in Kentucky, after the flush is off, holds up over a long period of years. More efficient operating methods and the drilling of wells farther apart will surely mean larger production per well. Many mistakes were made in the early days of the field and at least three wells were drilled on a number of properties where one would have secured the production. This unnecessarily increased development and operating costs, and cut down the profits. Notwithstanding this, large profits have been made in the State from the production of oil in spite of low prices during the past few years. With higher crude prices and lower development and operating costs, further work will probably show greater return.

Week's Work

A brief of the week's work shows 26 completions, 8 failures, 2 gas wells and 16 producing wells with a combined initial yield of 266 bbls. Compared with the previous week this shows 6 less completions, 5 less producing wells, 155 bbls. decrease in flush output, 2 fewer dry holes and 1 more gas well. The completions were distributed as follows:

County—	Comp.	Prod. Wells	Prod.	Dry	Gas
Barren	5	3	25	2	0
Lee-Owsley	4	3	43	1	0
Lawrence-Johnson	4	4	132	0	0
Owensboro district	3	2	15	1	0
Warren	2	1	15	1	0
Allen	2	2	30	0	0
Cumberland-Monroe	2	0	0	2	0
Johnson-Magoffin	2	1	6	1	0
Floyd	1	0	0	0	1
Martin	1	0	0	0	1
Total	26	16	266	8	2
Last week	32	21	421	10	1
Difference	6	5	155	2	1

Tennessee News

Dafoe and associates have completed two more wells in the new pool recently opened by them at Tinsley's Bottom lying in Clay and Jackson Counties in northern Tennessee. No. 1 Draper, three-quarters of a mile east of the Lynn gusher, struck the Pencil Cave at 300 feet and at 350 feet commenced flowing and was capped in. The sand in this well was found at 40 feet below the Cave where No. 1 Hamp Lynn is producing. No. 1 Swan, approximately three-quarters of a mile south of the Draper and 1 mile south and east of the Lynn wells, is estimated at 25 bbls. at 550 feet, 200 feet below the Pencil Cave. Dafoe's No. 1 Ogelthorpe, 2 miles west of the Hamp Lynn, encountered gas at 200 feet and is temporarily shut down.

It is evident that Clay, Jackson, Overton, Pickett, Scott and Morgan Counties, just south of the Kentucky line in Tennessee, are in for a large development in the immediate future. Dafoe and his associates hold 10,000 acres of leases which they intend to develop as quickly as possible. The first of the week four new locations will be drilled on by the Dafoes, while several other operators are planning development work and state they will drill several holes.

No. 1 Hamp Lynn, completed at 40 feet below the Pencil Cave, and No. 2 on the same farm have to date filled eighteen 250-bbl. tanks and are still holding up in fine shape. These wells, if opened up, would have made much more but, owing to the lack of pipe line facilities in this section, have been shut in most of the time. The oil here is secured from below the Pencil Cave and no water is encountered below the cave. Six and one-quarter inch casing is set below the cave, which runs about 325 feet.

Western Division

Due to increases in the price of crude, pipe line runs from the various producing counties in the Western Kentucky Field show an increase of 12,371.62 bbls. for the month of January with a total run of 108,467.35 bbls. The runs were distributed by counties as follows, showing increase and decrease from each county compared with December figures:

County—	Jan. Runs	Increase	Decrease
Warren	48,120.47	7,925.80	.....
Allen	27,276.27	2,704.30	.....
Hancock-Ohio	11,152.86	884.52	.....
Barren	10,970.26	.....	1,238.56
Cumberland-Monroe	8,669.06	1,826.38	.....
Simpson	945.71	36.46	.....
Hopkins (app.)	750.00	.....	350.00
Clinton	582.72	582.72	.....
Jan. runs	108,467.35	13,960.18	1,588.56
Dec. runs	96,095.73		
Difference	12,371.62		

Barren County

Two amber oil wells were struck in the Gorby Pool, southwest of Glasgow, in Barren County the past week. Porter and others' No. 2 McLaughlin hit this shallow strata at 135 feet, 60 feet above the Black shale, where it flowed 40 bbls. Since being tubed and pumped it has held up its initial. Lewis Emery, Jr., & Sons' No. 5 Depp and Greer, one-quarter of a mile from the McLaughlin, hit this same pay where it flowed 110 bbls. When this pocket of oil was struck in this well it ignited and burned the rig, owned by T. M. Bane. This is the second rig of Bane's to be destroyed by fire during the past three months.

In the Hall Baker area, north of Glasgow, the Consolidated Gas Co.'s No. 3 Hall Baker is pumping 15 bbls. at 562 feet; Harrington and Norris' No. 2 Evans, south of the Baker, was estimated at 11 bbls.; Wood Oil Co.'s No. 3 Will Church was dry and abandoned at 540 feet; McCandless and others' No. 1 Horace Church was a failure at 570 feet.

In the Emery-Moore Pool, Stafford, and Rhoedener's No. 2 Lewis, adjoining the Howard, tested 2 bbls. at 185 feet below the shale.

Drilling Activities

Emery-Moore Pool: Star Oil Co.'s No. 14 Ritchie, drilling in; No. 6 Star, drilling at 90 feet; Wiggins & Gillespie's No. 8 Scott, drilling at 200 feet; Fred C. Moore's No. 4 Travis, drilling 100 feet below the shale; Harrington and others' No. 5 Burrins, drilling at 150 feet; Carter Oil Co.'s No. 5 Gooden, shut down at 325 feet with broken engine; Esslinger Oil Co. has moved a rig to drill No. 3 Steffey deeper.

Gorby Pool: Big Jack Oil & Development Co.'s No. 1 Hatfield, cleaning out after shot. As soon as the amber oil struck in the McLaughlin and Greer wells is exhausted, the holes will be carried down to the regular pay sand.

Hall Baker Pool: Consolidated Gas Co.'s Nos. 4, 5 and 6 Hall Baker were drilling at 75, 45 and 12 feet, respectively; No. 1 Turner, spudding; Harrington and Norris' No. 3 Evans was being rigged up; Wood Oil Co.'s No. 3 John Church was being cleaned out after a shot; T. J. Sansoms No. 1 B. F. Myers is showing for a small well after being shot with 30 quarts of nitro.

Allen County

The discovery of a deeper sand in the Roedemer district of Allen County is of great importance to that field. Tests already show that this new sand covers a considerable area, and may occur in other sections of the county. During the week the best completion was on the Duke lease, at Roedemer, lying between the old Frost Pool and McReynolds Pool, in both of which the deep sand has been found with good production. It was completed by Victor DeCaigny with this own tools, at a total depth of 368 feet, where it made 20 bbls. The White Plains Oil & Gas Co.s No. 10 J. R. Hornbuckle, adjoining the Frost, pumped 10 bbls. at 397 feet. On the Warren McReynolds lease, first drilled in 1918, the Seaboard Oil Co. has deepened several of its wells with good success. H. A. Kiser, of Scottsville, has recently purchased the J. T. Jones lease, west of the railroad near Roedemer, with several wells which he intends to drill to the deeper pay.

Owensboro District

C. E. Daugherty brought in two small pumpers on the Widow Crowe lease in the new area, recently opened by a completion on the Swope Brothers farm, 2 miles south of the Herbert School House Pool, in the Owensboro district, for 10 and 5 bbls. each from the Barlow sand. Rigs are being moved to Nos. 3 and 4 locations on the same farm.

Thomas and others' No. 2 J. H. Evans, at Collier's Station, is dry at 725 feet. It was drilled 800 feet south of No. 1. The rig is being moved to No. 3, 400 feet north of No. 2 and the same distance south of No. 1. Same operators are moving to a location on the Hefley place in the vicinity of the Jackson wells. The Wood Oil Co. is moving to drill No. 3 J. M. Bartley; C. A. Leeper's No. 1 Beaucamp is spudding in; I. N. Harkless' No. 1 Widow Bickett was drilled through the Jackson sand and has a hole full of water.

The Panther Creek Oil Co.'s No. 12 R. M. Miller is showing for 5 bbls. in 15 feet of Jett sand. The well will be drilled down to the Barlow for a combination well.

Warren County

Drilling has fallen off in Warren County during the past few weeks due to the poor condition of roads leading to the different pools. In the Richpond Section, Lowman & Bolling finished No. 4 on the H. Shannon for 15 bbls. after shooting 12 feet of sand from 456 to 468

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Fields of the Central West

By Whit

FINDLAY, Ohio, Feb. 23.—With the new prices the operator can see his way clear to the development work on a profit basis and much wildcatting will be done in the Central West fields. The old Trenton Rock Field of northwestern Ohio is being combed over for leases both within defined limits and on the outer edges and leasing has been done as far south as near Dayton and north clear to the Michigan State line.

Owing to the good prices of crude, it would be a good thing for operators to join forces and do some deep drilling in the old Lima Field, especially if the counties of Wood, Hancock, Sandusky, Ottawa, Allen, Auglaize and parts of Mercer Counties, where in the early days gushers were found galore. The idea has always prevailed that no oil would be found below the Trenton Rock, but no one can tell what lies there until a number of tests have been sunk far below the St. Peter sand. This sand lies directly below the Trenton and about the only hole known of drilled to this lower formation in the northwestern Ohio area, was many years ago on the ex-President Rutherford B. Hays farm, in Portage Township, Wood County, which found approximately 900 feet of Trenton Rock which the drill passed through and when the St. Peter sand was entered a short distance the drill was stopped and the hole given up as a failure. There is little doubt but what oil can be found below the Trenton in the Lima Field, anyway, it is well worth the price of testing out to a depth around 3,500 to 4,000 feet, to satisfy the curiosity of those more or less interested, for it is about at these depths that Pre-Cambrian crystalline rocks lie.

To show that there are oil sands below the Trenton there was the well drilled about two years ago by the Sub-Trenton Oil Co., in Section 7, Bear Creek Township, Jay County, near Bryant, Indiana. In this well the St. Peter sand was thin, there being but about 15 feet of the formation. Indications of oil were found in two horizons below the St. Peter sand. The first indication was at a depth of 2,370 feet, approximately 800 feet below the bottom of the Trenton, where 30 feet of sand was encountered with an oil showing. The next sand encountered was at a depth of 2,800 feet or 1,230 feet below the Trenton. The latter sand, according to reports of the contractors, contained asphaltum, oil and salt water. The well was sent to a total depth of 3,290 feet, if reports are true. Nothing was ever done with the well as no glycerine was exposed to test out the deep down sands. If showings of oil can be found in the Indiana section of the Trenton Rock Field, possibilities are good for unearthing something in the old gusher territory of Wood and other counties in northwestern Ohio.

Lima Field

During the week a total of eight wells were completed in the old Lima Field of northwestern Ohio, with two dry holes

(Continued on Page 118)

THE LAYNE

Patent

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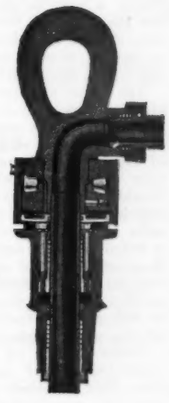
Outside View

Swivel



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Top View

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Bottom View

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NATURAL GAS DEVELOPMENTS

LIGNITE GAS PATENT INVENTED BY TEXANS

DALLAS, Tex., Feb. 21.—An invention which may prove valuable to Texas has been perfected by two natives of this State, according to John M. Spellman, patent attorney. It is a gas producer to convert lignite coal into gas for manufacturing and industrial use as well as for domestic purposes. It has been perfected by Frank Modlin of Fort Worth and E. M. Braxton of Corsicana.

"There is no doubt," says Spellman, "that the gas supply will play out eventually. That time may not be far distant. There are vast lignite beds in Texas, some covering whole counties. In the past they have been valueless. Lignite is a substance not yet sufficiently aged to become coal through the long process of nature."

The idea of Modlin and Braxton is not entirely new. A number of lignite gas producers have been invented and tested by the United States Bureau of Mines and by the Bureau of Standards. They have been unable to remove the tarry, sticky substance with which "lignite gas" is impregnated, and which, when the gas cools, congeals and clogs the flow through the pipe lines.

The invention of Modlin and Braxton, however, is said to be different in that by an ingenuous method of superheating the gas after its manufacture, this gummy substance is removed and converted into additional heating units. A plant for the manufacture of "lignite gas," modeled after the patent was constructed at Corsicana, but the gas and oil boom there necessitated that it cease operations. Since then Spellman has patented several improvements to the original device and he predicts it will be of great value to the country, and particularly to Texas, when the present supply of natural gas plays out.

SAPULPA VOTES DOWN GAS FRANCHISE PLAN

Voters of Sapulpa, Okla., defeated the application of the Sapulpa Fuel Co. for a franchise to furnish commercial and industrial gas by a vote of 666 against and 501 for the proposition. The voting was light.

The chamber of commerce declared the wording of the franchise was misleading.

The franchise was for furnishing industrial gas at 20 cents per 1,000 feet. Opposers attacked a statement that it would mean 40-cent gas for domestic users, and alleged that the franchise would bind the city so that no other company could come in and furnish lower rates. The city now pays 63 cents for domestic gas from the Oklahoma Natural Gas Co. A fight to oust it has been started and litigation is pending. The city also asks to collect rent from the company for its streets, which it alleges have been used for several months past the expiration of the company's franchise.

TYLER, TEX., SUPPLY TO COME FROM WASKOM

TYLER, Tex., Feb. 21.—The city commission has granted a franchise to W. M. Moorefield, of Shreveport, to supply the city of Tyler with natural gas. The franchise is subject to approval of the people at a general election the first Tuesday in April.

The franchise provides that Moorefield shall begin work within four months after ratification. Natural gas for domestic use will be supplied at 75 cents, the rate for industrial gas will be fixed later; the minimum for gas will be $1.50 per month. Moorefield states he will lay a 12-inch main from Waskom, where he is the owner of several gas wells producing many million feet of gas daily.

USE OR CONSERVATION OF TEXAS GAS ARGUED AT AMARILLO AND AUSTIN

AMARILLO, Tex., Feb. 23.—Must untold millions of feet of natural gas, containing enough of elements of carbon black to manufacture automobile tires for a generation, be indefinitely locked up in deep earth caverns lying under the Texas Panhandle that light and heat requirements of the human family for some future decades may be conserved?

No more important question than this ever has been asked on the Staked Plains, according to some of the leading thinkers and industrial leaders of this section. It is certain that no question affecting vitally the industrial welfare of the section has been more intelligently discussed or presented such polar separation of ideas.

The Texas Legislature may answer it to the satisfaction of one school or the other. It may be that the Department of the Interior, now endeavoring to identify new sources of helium for aircraft, may in part answer it to the satisfaction of one school or the other.

The crux of this problem is that a string of gas wells over 80 miles long lies etched upon the surface of the Staked Plains, existing eastward from the line of New Mexico, and following the surface contours of what Dr. Charles N. Gould of the Oklahoma Geological Survey has designated as the "buried Amarillo Mountains"; that these wells have a potential daily output running into billions of feet; and that, the territory being far from centers of population, no market has been found or is in prospect of being found for an infinitesimal part of this great production.

These owners of great ranches and other owners of royalty interests that have cost hundreds of thousands of dollars perceive that if a strict policy of conservation is followed they can not expect to receive any appreciable income from gas during their lifetime and some of them regard the investment as a total loss.

In other words, it apears that these land and royalty owners and the drillers of wells who have spent over $5,000,000 in holes have unwittingly invested gigantic sums to discover gas and store it away for the benefit of mankind after they are dead and gone.

On the other hand, Federal and State departments having to do with the conservation of nautral resources must of necessity oppose an unnecessary waste of this great new resource of the cattle country. The greater good is far superior to the financial interests of the unfortunate few.

Ask Carbon Black Permits

Involved in discussions at this time is the question of whether the State of Texas will permit the establishment of carbon black plants in the Panhandle to put to profitable use a few hundred million feet daily of this gas. A majority of Panhandle land owners are demanding such permits. A majority of commercial clubs and town and city councils are opposing them. Each group has a lobby down at Austin. In each group may be found representatives of some of the largest oil producing concerns in America, for some of these have invested millions here and at least one of them holds leases to over 400,000 acres of land.

McConnell Brothers, of Pampa, have 5,000 acres of land in Gray and Carson counties on which is a well two years old with a daily capacity of 40,000,000 feet for which there is no market. It is 6 miles from White Deer and 8 miles from Pampa, "yet neither town has natural gas," says a representative of this firm, "for the reason that the selling of this gas in either town would not pay the interest on the cost of the pipe line. Whenever a man owns an article or a product he generally has the privilege of marketing it, not giving it to future generations and receiving nothing in return. . . . We resent dictation from commercial clubs, and we will make this proposition to Clarendon (a Panhandle town, that if Clarendon wants gas and will build a pipe line to our well, we will furnish gas the first year free and give them a carbon black price for the balance of the life of the well."

Argument of Opposition

An argument in opposing the granting of promiscuous permits to carbon-black manufacturers was produced at a recent meeting of ranch owners in Amarillo. The substance of it was that royalties paid by such manufacturers to gas producers are too low to be profitable to royalty owners. A statement was prepared at this meeting and signed by a committee of which Lee Blevins was chairman, to the effect that 2 cents per 1,000 feet is what the manufacturer would pay at the well, that this amount of gas would make four to six pounds of lamp black and one gallon of casinghead gasoline, that the lamp black is worth 12 cents a pound and the gasoline 8 to 10 cents a gallon, making a gross revenue of 50 cents.

"Under the figures brought out at this meeting," says the statement, "it would be necessary to burn gas enough to produce $20,000,000 worth of lamp black before the combined land owners of all counties would obtain $10,000 in royalties. . . Better to retain this gas for future generations than to permit its destructive burning for such small renumeration."

The statement concluded that these land owners would be willing to sell gas for carbon black manufacturers only on condition "that the land owners or royalty owners receive not less than one-eighth of the gross revenue from the manufacture and sale of carbon black, helium gas, casinghead gasoline, or any and all other byproducts produced from such gas through the benefits of permits by the Legislatiure of the State of Texas in this district, and that payment for said products be made at the market price when removed from the premises."

The necessity of producing gas along with oil in sections the Panhandle is another matter being considered. This was pointed out in a recent statement by George E. Montgomery, an oil broker of Amarillo, who says that in the Amarillo Field "75 per cent of the oil producing wells produce from 1,000,000 to 3,000,000 feet of gas with the oil. There is no way this gas can be separated and saved. This is why the State is now issuing permits to carbon black people in the Ranger and Desdemona fields. These people have invested millions of dollars and they are turning into money that which is going to waste in the Amarillo Field today."

Fear Removal Outside State

Montgomery points out the possibility of Panhandle gas being piped into other States where carbon black plants are located. He said he had a letter from the oil and gas conservation bureau of Colorado saying there is no law forbidding carbon black manufacturing in that State and he hoped there never would be. New Mexico, he found, has no law against this industry and is anxious to have plants established there.

"The Amarillo Field today," he says, "is owned and controlled by the major companies. Practically all of them are in the business of manufacturing carbon black. . . If you do not want these plants in Amarillo and adjacent counties, these concerns will take this gas out of your State and handle it to suit themselves."

The Amarillo Board of City Development, viewing the controversy with extreme interest, has sent a resolution to the Legislature in which it says "that the Board of City Development, which is the Chamber of Commerce of the City of Amarillo, and which body is supported by taxation of all the taxpayers of the City of Amarillo, goes on record as opposing any legislation which would permit the use of natural gas resources for the purpose of manufacture of carbon black, for the reason that we believe that the future development of all our neighobring towns and cities will be best served by conserving this natural resource so that these towns and cities can obtain this natural gas for their domestic consumption in the same manner as Amarillo is now using it."

"Carbon black is being made in only six States and I have in my file telegrams from the gas divisions of these States stating that they are absolutely opposed to the manufacture of carbon black from gas," says a statement received here from Bryan Blalock, secretary of the Chamber of Commerce at Marshall, Tex. "Once a carbon black plant gets into a gas field, regardless of how large the field, legitimate industries, dependent upon natural gas, will not locate in a town where the gas supply is being jeopardized by carbon black."

Gas producers fear that no development strides of the Staked Plains during the next 10 to 20 years will be great enough to make gas production pay on the average if gas is to be sold alone for domestic purposes. This fear was increased when they learned that chemists of the United States Geological Survey have discovered a process for manfacturing carbon black from crude oil, and by

(Continued on Page 144)

CARBON BLACK LAWS UPHELD IN WYOMING

CASPER, Wyo., Feb. 21.—The carbon black case brought by Roy Willey and others against the State of Wyoming was decided at Cheyenne in the District Court for the State. This case was a test of the carbon black manufacturing law passed by the Legislature in 1919. The suit was brought as an injunction to allow the plaintiffs, Willey and others, to manufacture carbon black from natural gas produced from their lands and to restrain the Wyoming officials from interfering with their manufacture of this carbon black.

The law prohibited the manufacture of carbon black within the limits of an incorporated town or city and was intended to restrict the use of natural gas for more conservative purposes than making carbon black, considered wasteful. One case of this nature has already been carried to the Supreme Court and was decided in favor of the law.

Judge Riner, in giving his decision, stated: "It seems to me the decision," (referring to the Federal Court decision on the previous case), "is predicated upon the principle well established that by the exercise of police power, through legislative enactments, individuals may be subjected to restraints and the enjoyment of personal or property rights may be limited, or even prevented, if manifestly necessary to develop the resources of the State, improve its industrial condition and advance the safety, comfort and prosperity of its people."

GAS FOR MEDFORD, OKLA.

The Hoy Oil & Gas Co., an organization formed by Medford, Okla., residents, has applied for a franchise to pipe and distribute gas for domestic and industrial consumption in the city. The officers are: R. J. Early, president; D. J. Wilson, vice president; H. D. Reed, treasurer, and John Hoy, general manager. Reece McGee, of Blackwell, is said to have obtained the contract to install the distribution system.

SPANG
Weldless Drilling Jars

—Show Up Best In The Very Hardest Lime and Sand

Shale, hard lime and sand surely raise "hobs" with the average welded drilling jar.

But you ought not blame them, they are made that way.

On the other hand, the Spang Weldless Jar is so constructed that it shows to decided advantage when used on wells where such conditions abound.

Intelligent construction and heat-treating of the alloy steel used in the Spang Weldless Jar has resulted in giving it a stronger, more serviceable and useful life.

SPANG Weldless Jars seldom break or fail. They are made from a single piece and carefully inspected and tested for all flaws of manufacture.

If you want a serviceable, economical drilling jar—use the SPANG Weldless.

Reasons aplenty why you should use the SPANG Weldless

- Excellent joints
- Greatly increased footage drilled
- Elimination of Jar Fishing jobs
- Reduction of drilling risk
- Three to five times as much service as other jars
- Increased profits.

SPANG
Thread Protector

Protect your Tool Joints with SPANG Thread Protectors. *Like all SPANG Products they guarantee absolute satisfaction and long, durable service.*

Spang and Company
Butler, Penna.

Sold by All Leading Supply Houses Everywhere

MEN KNOWN IN OILDOM

Paul S. Ache

Paul S. Ache was born in Pittsburgh, Pa., on March 25, 1881, and comes of a well known family of that region. As a boy he attended the grade schools in Pittsburgh and later the Pennsylvania Military Academy, from which school he was graduated with high honors. He then took a post graduate course in civil engineering at Columbia University in New York and afterwards entered the oil business in western Pennsylvania.

He became associated with many of the older pioneers including T. N. Barnsdall, Benedum & Trees and others and as his operations prospered, the firm of Flinn & Ache was formed which is active in many States and has offices in Pittsburgh, Pa., Eureka, Kans., and Denver, Colo. He is also associated with S. J. Brendel in the Brendel & Ache Syndicate.

Mr. Ache is a member of the Duquesne Club of Pittsburgh, Pa., the Union Club, Pittsburgh Athletic Club, Pittsburgh Field Club, Pittsburgh Country Club and the Pittsburgh Automobile Club. He is engaged in drilling several wildcat wells at present in the Rocky Mountain region and also in Louisiana, Texas, Kansas and Oklahoma.

PERSONAL PARAGRAPHS

John Larkin, of Tulsa, Okla., was a Pittsburgh, Pa., visitor last week.

* * *

Seth G. Wells, of Erie, Kans., has been appointed State oil inspector of Kansas.

* * *

Mr. and Mrs. George Bennett, of Petrolia, Ont., have left via New York for the Peruvian fields.

* * *

H. F. Tuttle is in charge of the office opened by the Independent Lubricating Company, at Kansas City, Mo.

* * *

Mr. and Mrs. C. M. Stagers, formerly of Ponca City, Okla., have left for a three months' visit in Los Angeles, Cal.

* * *

George D. Locke, vice president of the Barnsdall Refining Company, has returned to headquarters at the Chicago office.

* * *

Robert Law, Jr., president of the Barnsdall Corporation, arrived at the Chicago office last week for a visit of several days.

* * *

A. C. Weigel, manager of the New York office of the Walsh & Weidner Boiler Company, visited the home office at Chattanooga, Tenn., last week. After a brief visit there, Mr. Weigel will go to New Orleans and Cuba in the interest of his company.

Walter Johnson, of the Seaboard Midland Petroleum Corporation, has returned with his family from a vacation in New York.

* * *

S. B. Eckert, of Philadelphia, Pa., sales manager of the Sun Oil Company, recently made a tour of the Mid-Continent Field.

* * *

Russell Lloyd, of Denver, Colo., consulting geologist, has recovered from his recent operation, and is back at his office.

* * *

C. W. Hortsmair, of the Sinclair Crude Oil Purchasing Company, Denver, Colo., spent several days in Casper, Wyo., last week.

* * *

E. B. Marlow, of Tulsa, vice president of the Sinclair Crude Oil Purchasing Company, recently made a tour of the Far West oil fields.

* * *

C. H. Besse, of the firm of Mahan, McCarty & Besse, Tulsa, left recently to supervise the erection of a rig at Wagon Mound, N. M.

* * *

W. A. Williams, assistant petroleum engineer for the Bureau of Mines, has been transferred from Casper, Wyo., to Drumright, Okla.

* * *

L. W. Young, Parkersburg, W. Va., retired gauger of the Eureka Pipe Line Company, was the guest of Peter Shearer, Pittsburgh, Pa., last week.

* * *

J. H. Jenkins, Jr., head of the land department of the Midwest Refining Company, was called to New Hampshire recently by the death of his father.

* * *

W. T. Ashcraft, lubricating oil salesman for the Magnolia Petroleum Company, has been transferred from the Arkansas district to the Tulsa division.

* * *

Hugh Trimble, general sales manager of the National Supply Company, Toledo, Ohio, recently returned from a tour of the Mid-Continent oil fields.

* * *

G. I. Sweney, of the Sweney Gasoline & Oil Company, Peoria, Ill., accompanied by Mrs. Sweney has sailed from New York on an extended ocean voyage.

* * *

F. W. Robinson has resigned his position with the Tide Water Oil Company, and will enter business for himself in New York as a dealer in petroleum products.

* * *

L. B. McCammon, of Tulsa, Okla., manager of the western division of the Transcontinental Oil Company, returned recently from a business trip to Austin, Tex.

* * *

A recent addition to the recently organized geological staff of the Prairie Oil & Gas Company is J. M. Armstrong, formerly with the Roxana Petroleum Corporation.

* * *

E. C. Obenshaw, of the Union Oil Company, has been appointed superintendent of the gas division of the Rocky Mountain division. His headquarters will be at Fort Collins, Colo.

* * *

Robert E. Ellis, formerly head of the Peer Oil Corporation's Kansas division, has returned from a vacation in California and Florida, and will reenter the oil business for himself in El Dorado, Kans.

* * *

Henry Brown has been made treasurer of the Continental Supply Company, with headquarters in St. Louis, Mo. Mr. Brown was formerly head of the credit department of the Atlas Supply Company at Muskogee, Okla.

* * *

Walter Hill, manufacturers' representative of the Fairbanks Company, New York, will be in Tulsa for some time associated with the Murray Tool & Supply Company, aiding that concern in the distribution of Fairbanks Company products.

* * *

Col. Burke Sinclair of the Midwest Refining Company, has returned to Wyoming from an extended trip to Eastern cities. Friends of Colonel and Mrs. Sinclair will be glad to learn that Mrs. Sinclair has completely recovered from a recent illness, and at present is visiting their daughter, who attends school in Chicago.

F. J. Huffman, vice president of the Penn Mex Fuel Company, has returned to the home office in Pittsburgh, Pa., after a visit of four weeks to the company's properties in Mexico.

* * *

The petroleum department of the Colorado School of Mines was visited recently by representatives of the National Petroleum Supply Company. Those in the party were: M. T. Archer, chief engineer; Carleton Clymer of the local Denver branch and Mr. Chandler, refinery engineer.

* * *

John B. Tonkin and John B. Corrin,, Pittsburgh, Pa., vice presidents of the Peoples Natural Gas Company and the Hope Natural Gas Company, respectively, attended the annual meeting of the Standard Oil Company of New Jersey, held at the offices of the company in New York recently.

* * *

C. E. Enlow, formerly with the Transcontinental Oil Company, has left Casper, Wyo., for the Mid-Continent fields to take a position in the Land Department of the Continental Oil Company and have his territory in the States of Texas, Arkansas and Louisiana.

* * *

David B. Reger, of Morgantown, W. Va., assistant geologist of the West Virginia Geological Survey, was in Pittsburgh, Pa., last week securing data for his forthcoming annual report to the American Institute of Mining and Metallurgical Engineers.

* * *

Charles E. Bowles, petroleum economist, has been engaged by the Mid-Continent Oil and Gas Association as assistant secretary. Mr. Bowles succeeds R. E. Kerfoot, who recently resigned owing to his wife's ill health. Mr. Bowles has attained a high place as an analysist of the petroleum industry.

* * *

Wade Shakely, superintendent of electrical equipment for the Pure Pipe Line Company, with Dallas, Tex., as headquarters, is inspecting on the south end of the line. Mr. Shakely is an Emlenton, Pa., native and has been with the Pure Oil Company for many years in the telegraph service.

* * *

M. T. Colligan, a young pipeliner from the Eastern fields, is now located in Houston, Tex., as field representative and engineer for the John Crane Metallic Packing Company. Mr. Colligan comes from a family which has been identified with the pipe line end of the industry for many years, both in the old Eastern and the Southwestern fields.

* * *

Edwin Anderson, of Fort Worth, Tex., has been in south Texas securing rights of way for the Pure Pipe Line Company. Mr. Anderson was connected with the land and lease department of the Standard's gas interests at Oil City, Pa., for several years. He secured rights for the Sinclair pipe line from Wyoming to Nebraska and for other long lines in the West.

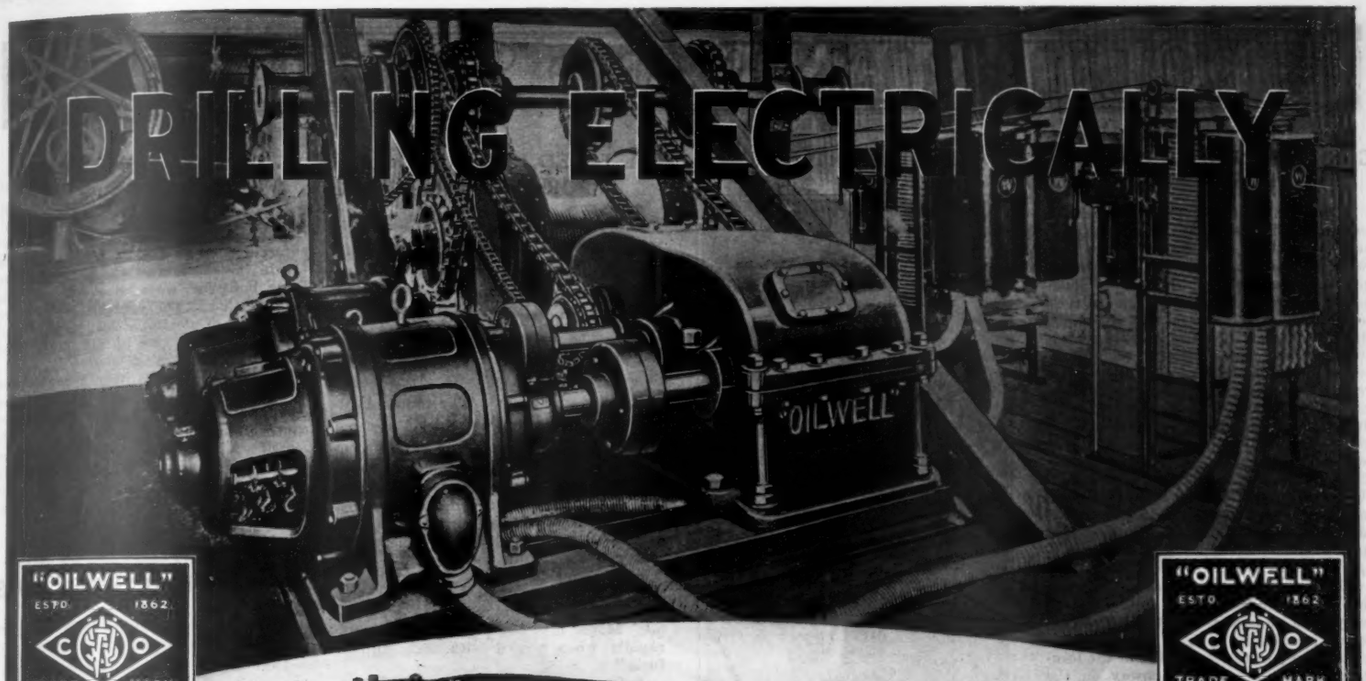
* * *

W. H. Dufur, who calls Oil City, Pa., home, but lives most of the year in California, was a recent Houston, Tex., visitor. Mr. Dufur made a tour of the northern, central and northeast Texas fields before coming to the Gulf region. During the days of speculation in oil certificates he was an active member of the Oil City Exchange. He is intimately acquainted with every producing region of importance in this country, Mexico and Central America.

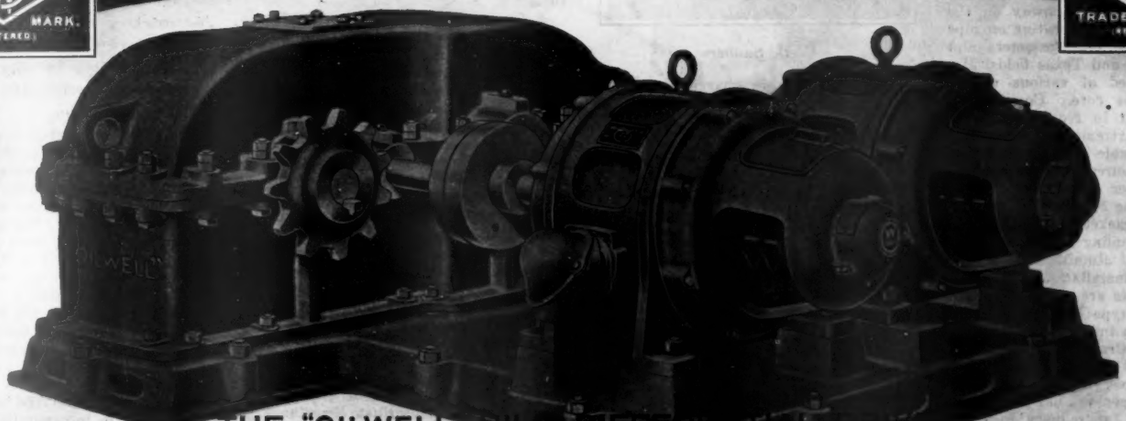
* * *

Joseph S. Sidwell has entered the service of the Prairie Oil & Gas Company, at the Tulsa office and will be engaged primarily on special field investigations and appraisals for the company. Mr. Sidwell is well known throughout the oil country, both at home and abroad. He became associated with the South-Penn Oil Company and continued with it until 1910. He was then transferred to the Penn-Mex Fuel Company, being general manager for its properties in Mexico until 1913. After that he was associated with the Standard Oil Company of New Jersey and the Carter Oil Company in foreign service, until 1919, when he became vice president and general manager of the Eastern division of the Carter Oil Company, at Parkersburg, W. Va. He then became associated with the Transcontinental Oil Company, in charge of production, severing his connections with that company in October, 1924.

DRILLING ELECTRICALLY



"OILWELL" ESTD. 1862 C O TRADE MARK. (REGISTERED)



"OILWELL" ESTD. 1862 C O TRADE MARK. (REGISTERED)

THE "OILWELL"

The "OILWELL" Hild Differential Drive is an electrical [illegible] which is used in connection with the standard rotary draw works or hoist in exactly the same way as a steam drilling engine is used—but in addition, it ***automatically*** feeds the [illegible] regulates or varies the bit pressure [illegible] ration in formations encountered. For complete design, construction, and operation data, write for Bulletin No. 60 or get a copy at any of our 100 Branches.

OIL WELL SUPPLY CO.

NEW YORK—LOS ANGELES—PITTSBURGH, U.S.A.—SAN FRANCISCO—TAMPICO—LONDON

WORLD'S OLDEST AND LARGEST MANUFACTURERS OF OIL FIELD EQUIPMENT

EQUIPMENT AND SUPPLIES

GASKETS REDUCE FIRE HAZARDS IN REFINERIES

What causes most refinery fires? A leaking joint. Gradually the pipe cools and the fittings contract. Moisture appears between the flanges and drips. It grows into a trickle down the pipe, finds a path along the floor, seeming intuitively to seek the spark or flame that will ignite its hazardous trail. The development of cracking processes, gasoline plants and refineries demanded a gasket that would reduce this omnipresent fire hazard; a gasket resilient, pressure-resisting and fireproof. Preferably a ready-made gasket of easy application, that might, within reasonable limits, be reapplied. Time is the essence of the oil business; the man on the job counts the seconds in tearing down and re-erecting. Minutes run into dollars while equipment is idle. And when a leak appears, it means idleness until all is tight again.

McKim gaskets have been in the field for three decades. They are in use on every type of power, liquid and gas conveying installation imaginable. They are hidden away in the steam line of the locomotive; they are working away on the cracking still; they are operating on pipe line pumps and the big Bessemers and Ticos in Oklahoma and Texas fields. McKims are fabricated of various metals around an asbestos core. Copper and aluminum are most in requisition, with Monel metal for extreme chemical service. There is a double-jacketed construction for high pressures with two thicknesses of soft copper covering the asbestos. Included in the McKim line are the corrugated metal gasket put out in the various metals including Monel, and the plain flat washer of aluminum or copper for high pressure installation where the drawing-down agents are correspondingly heavy. A special type is supplied with a centering fin from inside the bolt circle for Van Stone and Cranelap flanges. The corrugated gasket is also supplied in this type for these flanges. Special sizes and odd shapes are in general use in the oil country. However for refinery installation it is seldom necessary to go outside the list of stock catalog sizes.

The salient points of McKim gaskets are said to be ability to withstand extreme pressures and temperatures, ease of application, freedom from deterioration, resistance to chemical action and the assurance that once applied the gaskets stay put and form a natural expansion joint without leaking.

M'DONALD EQUIPMENT SALES CONVENTION

A feature of the program at the annual sales convention of the Preferred Utilities Co., held at the company's home offices, 33 West 60th Street, New York City, recently, was a talk by C. L. Reeder, manager of the oil equipment division of the A. Y. McDonald Manufacturing Co., of Dubuque, Iowa. The Preferred Utilities Co. now represents the latter concern in the eastern States and carries a complete stock of McDonald oil equipment. One of the principal purposes of the convention was to provide the salesmen with exhaustive information on the McDonald products, and more than 70 salesmen were present.

The Preferred Utilities Co. just recently moved into its new quarters.

WESTCOTT CO.'S NEW PLANT

The Westcott Valve Co. announces that Art Wadsworth has become associated with the concern. The company's new plant at East St. Louis, Ill., is under construction and as soon as it is completed mnaufacturing headquarters will be moved to East St. Louis from Seneca Falls, N. Y., its present location.

OIL DEPARTMENT

C. B. Sanders

Mr. Sanders is in charge of the Oil Supplies Department established by Crane Co., of Chicago, to give the petroleum industry better service and cooperation. The department will make a study of different needs of the industry along lines covered by the company, especially in regard to valves and fittings for refineries and gasoline plants and will conduct research work in connection with a new line of steel for temperature and pressure cracking plants.

TREATISE DISCUSSES BOILER CONSTRUCTION

An interesting 8-page treatise dealing with the principles of boiler circulation has just been published by the Nuway Boiler & Engineering Co., 53 West Jackson Blvd., Chicago. This treatise discusses the importance of rapid circulation of boiler water, together with 12 reasons why rapid circulation is so important as a means of preventing priming, foaming, wet steam, etc.

The treatise also contains an interesting table showing the sizes of chimneys required for various sizes of boilers. The various stages of development of the steam boiler from the tea kettle to the latest design for efficient heat transfer and circulation are illustrated and described in an interesting manner. The effect of smaller fire tubes, increased staggering and greater space between tubes upon the rate of flow is discussed; also the use of baffle and end plates in such a manner as make the water velocity higher than by uncontrolled convection. This treatise will be of interest to all engineers and executives concerned with the operation and purchase of boilers. Copies may be obtained free from Nuway Boiler & Engineering Co., 53 West Jackson Blvd., Chicago.

CALIFORNIA BRANCH STORE

A new branch store has been opened in Bakersfield, Cal., by the Axelson Machine Co., of Los Angeles, with J. H. Jackson in charge. It is located at 1106 Nineteenth Street, Bakersfield. The new store was made necessary because of the great increase in business in that section, according to Charles D. Wagner, sales manager for the company, who recently returned from a tour of inspection of the Taft, Coalinga and Bakersfield districts. The greatly increased operations in the latter field have taken on the aspect of a real boom, according to Mr. Wagner.

OIL FIRED FURNACE FOR HEATING METAL

"An Oil-Fired Furnace for Monel Metal and Nickel" is the title of an article in the current issue of Inco,, a journal devoted to metal users, published by the International Nickel Co., of New York. The article, written by T. M. Eagan, superintendent of the Hammer Shop, of the company's Huntington works, says in part: "The proper heating of Monel metal and nickel for hot working purposes requires a careful consideration of methods whereby the furnace may be controlled to produce a neutral or slightly reducing atmosphere.

"The use of oil-fired furnaces presents a difficult problem due to the high percentage of sulphur contained in many fuel oils and the use of burners which permit air to flow into the furnace in unregulated amounts with the atomized oil. Monel metal and nickel deteriorate rapidly when heated with high sulphur fuels."

A furnace designed to control the admission of both oil and air, and also to give sufficient volume in the furnace so that only the products of combustion may reach the material being heated, is illustrated in connection with the article. Its design prevents oil from striking the surface of the metal during heating, "which point is absolutely essential to the practical and economical operating of this or any other type oil-burning furnace."

"The installation of nickel hearths in all heating furnaces used for the production of the highest grade of monel metal and nickel forgings is strongly recommended. In the writer's experience, a nickel hearth after 18 months of continuous service is in as good condition as at the time of installation."

Other articles contained in the same issue include "Pumping Basic to All Industry," "Some Details of the 'Holbol' Process," and "The Rust Resistance of Nickel Plated Steel."

OPENS ANOTHER OFFICE

The Zero Hour Torpedo Co. of Casper, Wyo., has opened an additional Mid-Continent office in Eureka, Kans., for the distribution of its patented electric bomb for detonating shots in oil wells. The Eureka office is in charge of C. E. Bruner who has been engaged in oil well shooting in the Kansas fields for some time. The Eureka office is in addition to the firm's Tulsa office, which was opened in December under the supervision of H. A. Jenkins, formerly connected with the Western Bank Supply Co. of Tulsa.

The Zero Hour Co. placed its first bomb plant, recently purchased engine and comuary for the J. A. Hull Co. Many subsequent shots have been placed for various Mid-Continent producers.

DESCRIBES PRODUCTS

The Foxboro Co., Inc., Foxboro, Mass., manufacturers of many different types of indicating, recording and controlling instruments, have published Bulletin No. 96-1. The purpose of this folder is to describe briefly, and to illustrate the Foxboro products.

TANK CAR ORDERS

An order for 50 insulated 8,050-gallon tank cars was received by the Standard Tank Car Co. of Sharon, Pa., recently from the Waite Phillips Co., of Tulsa. The Craig Oil Co. of Toledo, Ohio, also placed an order for 15 tank cars with the same concern.

AWARDED BIG CONTRACT

A contract was awarded to the Sheffield Steel Mills of the Kansas City Bolt & Nut Co., Kansas City, Mo., to supply the reenforcing bars to the B. W. Construction Co. in the erection of the immense plant being built for Sears, Roebuck & Co., in Kansas City. The contract will require 5,000 tons of steel at a cost of more than $250,000, and is one of the largest ever placed for reinforcing bars.

The Sheffield Mills have a capacity of 120,000 tons yearly and plans of the company call for a further increase because of present and expected future demand. A third open hearth furnace is to be added soon. W. L. Kennedy is Mid-Continent sales agent for the company, with offices in the Mayo Building, Tulsa.

NEW HORIZONTAL PUMP FOR REFINERY USES

The experience gained in watching the practical operation of a large number of hot oil pumps in use by refiners employing cracking processes, has enabled the Wilson-Snyder Manufacturing Co., of Pittsburgh, Pa., to offer a horizontal, direct acting, reciprocating pump which is unique in design.

When refiners using cracking processes first began to recognize that positive circulation at high temperature was essential to the highest possible gasoline yield, and that a hot oil pump was a necessity, the Wilson-Snyder Manufacturing Co., builders of heavy duty pumps, were called upon to make a large number of pumps to handle oil at 800 degrees temperature against high pressures. After much experimenting, the first order, consisting of 65 pumps for 32 stills, was completed and all of the pumps have been in successful operation ever since their installation.

Improvements on the original design, however, are incorporated in the new horizontal pump, and one of the main features of it is the all-important factor of safety. The fluid end is a single mild steel forging and the steam end is operated by a standard Wilson-Snyder balanced piston valve, making the entire pump of a design that meets all requirements for efficiency and safety. The direct acting feature, with positive displacement at each stroke, gives definite assurance of a maximum amount of oil passing through the tubes in the furnace.

BESSEMER EQUIPMENT IN CROMWELL POOL

The Bessemer Gas Engine Co. has completed the installation of its equipment at two new natural gasoline plants located in the Cromwell Pool of Oklahoma. Fourteen of the company's 165-h.p. Type 10 compressors were installed at the plant of the Cosden Oil & Gas Co. and six at the plant of the Carter Oil Co. The Cosden plant has a capacity of 28,000,000 feet of gas and that of the Carter 10,000,000 feet. The Bessemer company also installed two of its 265-E. C. engines for auxiliary power at the Carter plant. The installations have been made under the direction of the Tulsa branch office of Bessemer company.

GRAVER OFFICES MOVED

The Mid-Continent offices of the Graver Corp. of East Chicago, Ind., have been moved to a more central location in the new Atlas Building, Tulsa. Charles Marner, formerly chief engineer of the company, is still in charge. The room number is 810 and telephone numbers remain the same.

When WORTHAM called Jarecki was ready!

They came, those hustling pioneers who in a few months turned Wortham from a peaceful Texas town into a teeming city of towering derricks, and as usual found a Jarecki store nearby and ready.

And how they did make use of that store at Mexia! Valves and fittings, engines and boilers, cables and belting, everything from drilling machines to rigs they bought, and everything they found of proved Jarecki worth.

This, understand, was before any stores had been established at Wortham. It was another example of typical Jarecki service.

For similar service at any time, get in touch with the Jarecki store in your neighborhood. The most dependable products that search and research can produce or contract for await you, along with reasonable prices and a reputation for integrity and service that is 73 years old.

JARECKI
MANUFACTURING CO.
Erie, Pa., U. S. A.
St. Louis Pittsburgh El Dorado
Tulsa Eastland

Jarecki

"Everything Used or Needed About an Oil or Gas Lease"

133

Progress in Refining

By W. T. Anderson

Mounting costs compel efficiency. Cheap raw material may encourage waste, but rising prices enforce economy.

The petroleum refining industry is facing that compulsion as the cost of crude rises. Efficient though it has been in enlarging recovery it is feeling the need for super-efficiency.

It is with a view to assembling a survey of the most recent advances in the science of refining and in recognition of the coming convention of the Western Petroleum Refiners' Association, at which the progress of the industry will be discussed, that The Oil and Gas Journal is devoting the following section to that purpose.

The conservation of petroleum is now engaging, at the request of the Federal Oil Board established by President Coolidge, the attention of the entire oil industry.

The marvelous contribution which the refining branch has made to the actual conservation of our petroleum by increased production of refined oils, principally through the cracking processes, has been stressed frequently. But, astonishing as that achievement has been, the refining industry has accomplished and is accomplishing other economies and efficiencies no less remarkable.

Improved tower construction has enabled refiners to get through efficient fractionation a better product and more of it, at less cost.

Diligent research in chemistry has led to improvements in treating which have very materially aided in producing a superior product, also at less cost.

Intensive study of boiler construction and operation is constantly demonstrating the better utilization of steam.

Airtight tanks for storage and other facilities for the prevention of vapor losses have added to the volume of plant output.

Heat exchangers of all kinds have reduced fuel costs, the largest single item of operating expense.

Chemistry and engineering are continually laboring to avoid fuel waste.

The personnel director and safety engineer have attracted the best class of labor and reduced to a minimum the hazards of operation.

These are just a few of the outstanding developments in the past few years.

The cooperation of plant operators is being more and more urged and employed for the study and solution of common difficulties, the avoidance of waste and the more effective use of material and equipment.

This insistent search for improvement has sprung from the necessities of the industry compelled for years to produce an increasing output without a corresponding increase in raw material.

It has been stimulated further by a competition as keen as any in the world, technical, industrial and commercial.

Back of this, too, there has been the amazing revolution within the industry itself which within a score of years has made a former waste product its most valuable output, and at the same time has increased demand for it beyond all human anticipation.

The manner in which the refining industry has met this emergency has been one of the wonders of the modern world. It has been able to do it only by the most energetic and unremitting application, by summoning to its aid all the resources and skill of science and industry, and by attracting the highest quality of executive ability.

Today, with the decline of petroleum production, the refiners may be entering a new phase, calling for renewed effort and efficiency.

Fortunately that has been its training and experience. It has never been able to rest on its achievements. The pressure for its products would not permit relaxation.

In fact it has been the pride of the refining industry that it has managed to keep ahead of its needs, some times, to its cost, too far ahead. It has frequently suffered from its own superabundance.

The past few years of overproduction of crude with resulting "distress" gasoline and depression in the industry fell most heavily on the refining branch.

Political agitation made it the special target. A falling market in the period of peak consumption prevented it from having an opportunity to show its real capacity.

But if the production of crude is not restarted upward by the discovery of new sands or pools the present year may test the productiveness of the refiners and their ability to effect further improvements.

As higher prices will call into play the utmost enterprise of the producing end of the industry they will also demand from the refining end the maximum of effort in manufacturing economy and efficiency.

The adoption of cracking processes is but one stage in the program that will be necessary. In addition to the conservation of oil by increased recovery there must be conservation of fuel, of steam, of chemicals, of equipment, in the days when prices may verge on limiting consumption.

There will need to be closer adjustment of products, better balance between the output and the return of the various fractions. Marketing ability and manufacturing ability must match if competition is to be equalled or surpassed.

These things are being done now by the more successful organizations, but in the future they are likely to become essential for all who wish to survive.

It is the hope that the special features in this issue of The Oil and Gas Journal will assist to such an understanding as will be of benefit to the industry and to those who hold its future in their hands.

Trend in California Oil Refining

Great Progress Made in Development of Continuous Processes. Possibilities of Cracking Now Receiving Attention

By H. H. Cannon

The trend of development in the refining industry in California has always been along the line of continuous processes and during the past two or three years this development work has been put into practical application to a greater extent than ever before.

The reason for this is readily apparent. Until the flood of comparatively light oil from the fields in the Los Angeles Basin, California's main product from refining operations was fuel oil. Most of the crude produced in the State was of a heavy grade containing enough light ends to make it unfit for use as fuel without the removal of these light ends, consequently the problem before the refiner was to handle large quantities of crude through apparatus of low cost for the removal of a sufficient amount of the distillates to produce a fuel oil which would meet flash specifications. In addition to the necessity of removing these distillates, the crude usually contained varying amounts of sand and water, which it was also necessary to remove. As it requires very careful operation to distill crude oil containing appreciable amounts of water and sand in conventional stills, the pioneers of the refining industry in California developed the use of the pipe still, as it is commonly known. (See Figure 1.) Although there are numerous modifications of this apparatus, it consists in general of a pipe heater or "retort" set in a direct fired furnace; a "separator," "evaporator," or "blow tank" which is merely a closed shell to effect a separation of the light ends and water from the residuum; condensers for the condensation of these light ends; and heat exchangers for cooling the fuel oil and transferring the heat contained in this fuel to the incoming crude oil.

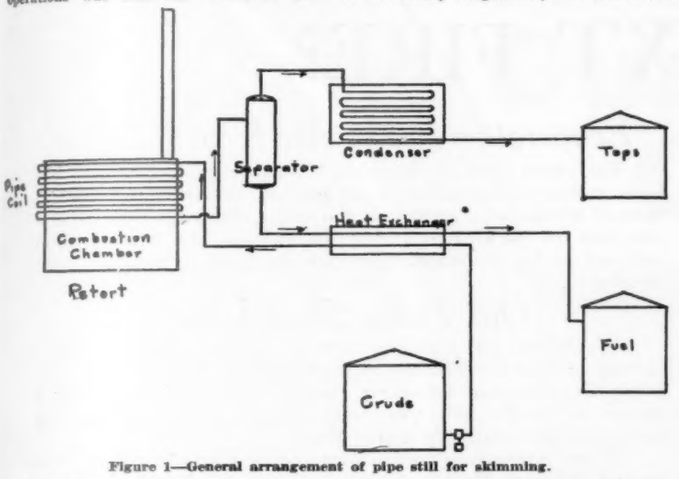


Figure 1—General arrangement of pipe still for skimming.

In the early plants using this pipe still type of apparatus, the pipe was usually 8, 10, or 12-inch and considerable trouble was encountered due to these pipes sagging, burning and becoming coated with a salt encrustation from the water contained in the crude oil. This necessitated frequent replacement of these heater pipes with a consequent high maintenance cost. By gradual development it has been found that by using smaller pipes in these heater coils, or retorts, with a consequent higher velocity, the life of the coils may be materially lengthened, and the result is that the coils are now usually constructed using 3, 4, or 5-inch pipe, although in some of the older plants the large size pipe is still used with a fair degree of success.

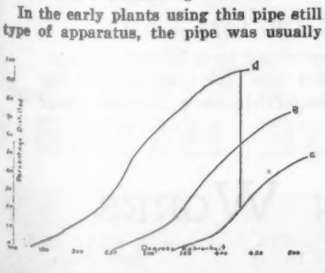


Figure 3—Distillation curves to show lap in dephlegmator.

The operation of this type of still can be seen by referring to Figure 1. The crude is first pumped through the heat exchanger to the pipe coil heater, or retort coil, set in the furnace where it is heated to a temperature of 400 to 600 degrees Fahrenheit. This operating temperature is governed by the grade of crude and the products desired. From the retort coil the crude passes to the separator where the separation of the vapors and the liquid takes place, the vapors leaving the top of the separator and being conducted to the condenser for condensation of the light ends and water, while the fuel oil residuum leaves the bottom of the separator, going through the heat exchanger opposite to the crude and then to storage.

One Type of Pipe Still

This diagram shows the simplest form of pipe still and one which is still used to a certain extent on crude oils which contain only enough light ends to reduce the flash point to a degree that makes it unfit for use as fuel and which also contains some sand and water which must also be removed for the production of fuel oil which will meet specifications. In this case the value of the tops recovered is small, as fuel oil is the main product desired, and it is necessary to use apparatus of a low initial cost and one which does not require very careful or skillful operation.

From this beginning has been developed all of the numerous types of pipe stills now in use in California. Figure 2 shows a diagrammatic flow sheet of one such unit. Referring to this drawing the crude is put first through a series of heat exchangers opposite the hot fuel oil residuum, cooling this residuum to a temperature of approximately 160 degrees Fahrenheit and heating the crude to a temperature of approximately 200 degrees Fahrenheit. From the heat exchangers the crude goes to one bank of pipe coils in the retort where it is further heated to approximately 400 degrees, and is discharged into the separator at this temperature. The vapors from this separator are led through a series of three dephlegmators where the distillates from 39 degrees gravity to 50 gravity ar taken off leaving the gasoline to be condensed in the condensers at the end of the row of dephlegmators. The residuum from the first separator at a temperature of approximately 325 degrees is pumped through the second bank of pipe coils in a retort which is fired separately from the first bank, where the temperature is raised to approximately 525 degrees, and is then discharged into the second separator. The residuum from this separator is run down direct through the heat exchangers to storage as fuel oil while the vapors are led into a second series of three dephlegmators where the distillates from 27 to 40 gravity are condensed out, while the vapors leaving the last dephlegmator are condensed to form a gasoline of from 50 to 54 gravity.

Dephlegmator Used

By reference to Figure 4 which shows a sketch of the type of dephlegmator most generally used in California, taken with the flow sheet shown in Figure 2 it will be seen that by proper regulation of the temperatures and the amount of steam and cooling water used in the various pieces of apparatus, an almost endless variety of "cuts" or fractions can be produced by this method of fractional condensation.

In Figure 3 are shown analyses of distillates produced in this type of apparatus. These distillation curves are shown for the purpose of illustrating graphically the method used to determine the sharpness of the cut produced by the dephlegmator. Curve "A" is a distillation of the gasoline condensed, this being the vapor from the last dephelegmator. Curves "B" and "C" are distillations of the condensate coming from the bottom of the last dephlegmator under different operating conditions. By extending a line from the end of the "A" curve downward it will be noted that this line intersects the curve "B" at approximately 60 per cent and intersects curve "C" at 25 per cent showing that in the distillate "B" there is remaining 60 per cent of material which would boil within the range of gasoline and in the distillate "C" there is remaining 25 per cent of material which would boil within the same range. As gasoline always has a higher market value than the heavier distillates it would be necessary to rerun the distillate "B" to recover this light material, or else to install more efficient dephlegmators to prevent this loss. When dephlegmators or towers were first installed in California it was no unusual thing to have a lap of as much or more than is shown in curve "B" but there are plants now less than shown in curve "C."

Use of Heat Exchangers

In some of the earlier plants the heat operating in California where the lap is exchangers and condensers were of the jacketed line type where one pipe is simply placed inside another pipe and suitably packed at the ends. As the price of fuel increased, more and more thought was given to the utilization of the heat contained in the residuum as well as the heat contained in the vapors until at the present time most plants are equipped with heat exchangers designed for the specific work they are to do and in some plants the crude is pumped through the tube condensing section of the dephlegmators. In these plants the oil is used in these condensing sections both for the recovery of the heat and for the purpose of preventing the deposition of scale in the tubes from the water due to the high temperatuer of the vapors surrounding the tubes. The most most generally used type of heat exchanger and condenser is now the shell and tube type, in which the tubes. The most generally used to 2 inches and the shells range from 8 inches to 4 feet. There is susually installed on any unit condesning and cooling surface enough so that one piece of apparatus can be taken out of service for cleaning at any time without interfering with the operation of the plant in any way. This is very essential when it is realized that a unit which will handle up to 15,000 bbls. of oil per day requires considerable time to shut down and a longer time to start up, so that a shut down to simply replace a small valve may necessitate a loss of operation of as much as three days. For this reason as well as for the fire hazard the larger companies are now using steel

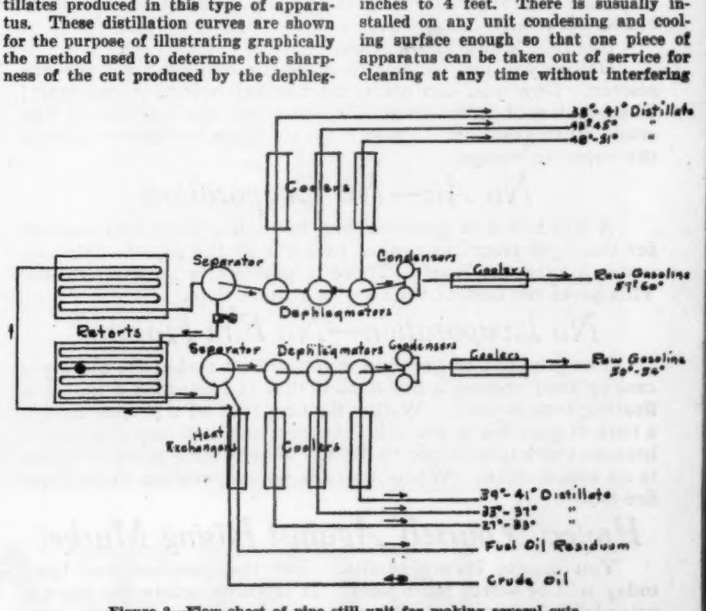


Figure 2—Flow sheet of pipe still unit for making several cuts.

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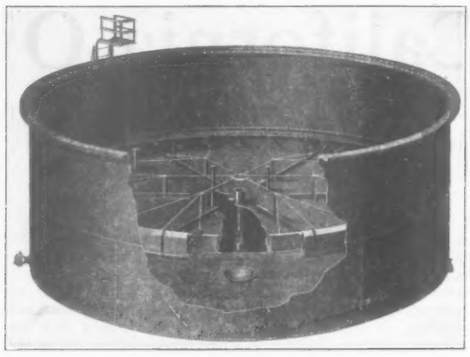

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For years John H. Wiggins, the inventor of this roof, has been making evaporation investigations, formerly for the Bureau of Mines, where he made the original studies for evaporation loss for the United States Government, and later for himself and during his association with the Chicago Bridge & Iron Works.

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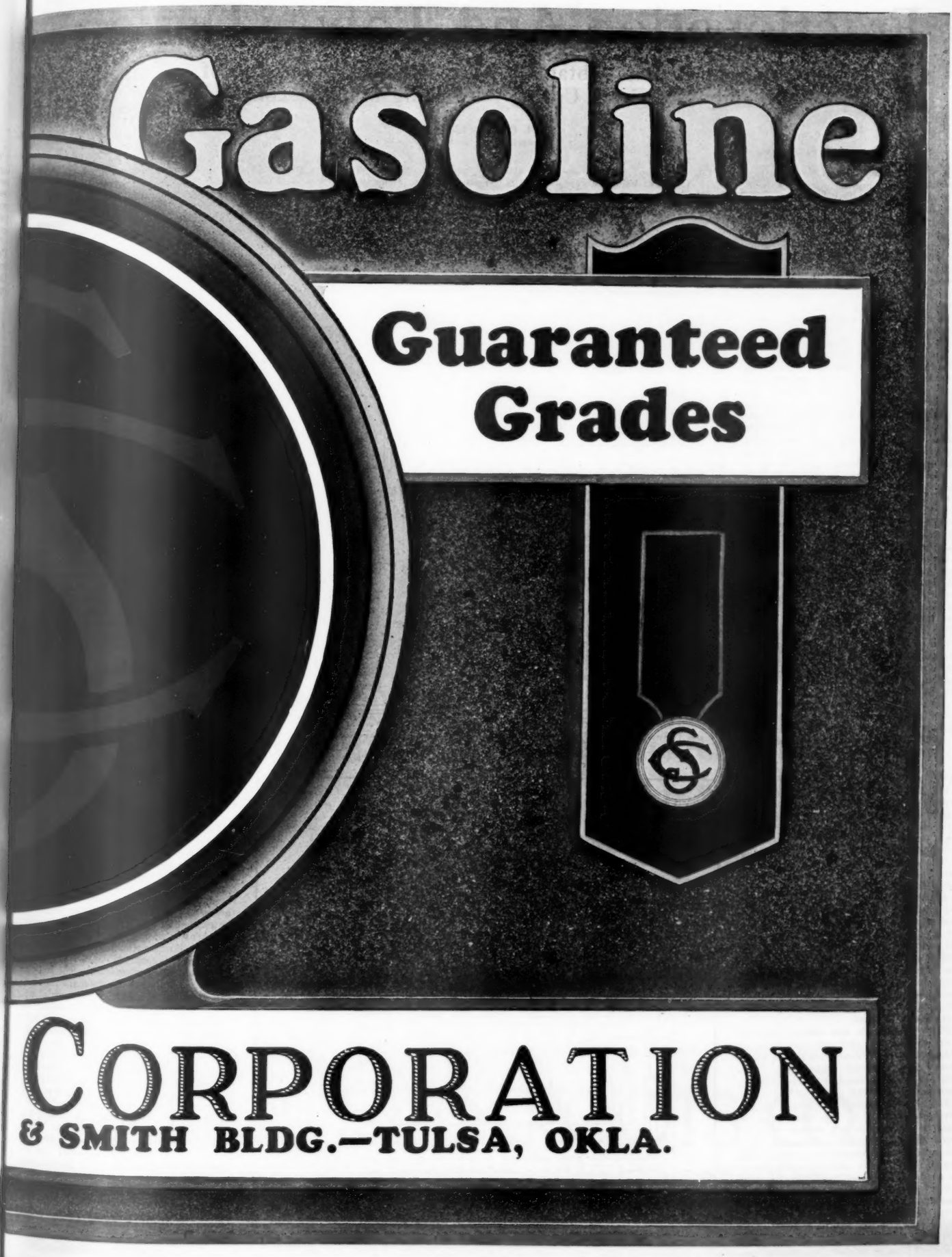
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Fractionation And Tower Design

Efficient Results Obtained With Proper Application of Thermodynamics. Use of Absorbing Media Explained

By I. B. Chittenden
Consulting Engineer

The development of fractionating towers has been accompanied the past few years with a marked degree of operating success. The different types as used by refiners have been discussed in trade publications and at meetings of refinery technical men and the performance of the towers explained, together with the results obtained.

Fractional distillation can be accomplished in any type of tower but the application of "Thermo Dynamics" in the design can ultimately save costly equipment and also assure more satisfactory results in operation. The use of bubble plates in towers has been of interest recently to the refiners. In operation it has often happened that the results obtained did not come up to expectation, modifications in design being necessary. At present the ultimate recovery of the predicted fractionation of the respective product is not accomplished by actual fractional distillation but by the fractional condensation in the application of suitable cooling media in direct contact with the hydrocarbons to be fractionated.

The use of a direct cooling medium for the accomplishment of fractionation is employed by nearly every refiner with varying success. But often times the theory of "fractional distillation" is being defeated by their performance. Fractional distillation should be accomplished with equipment designed to perform the separation of heavy, less volatile constituents from the volatile hydrocarbons undergoing fractionation.

The indirect system of condensation is applied to all efficient fractionating towers by the use of cooling media such as air, water or oil for the selective absorption of the heavier vapors. Therefore, in designing fractionating equipment, the law of "heat and water" is the controlling subject in the authentic performance. By applying this technology, the results obtained in the operation of the towers will be as predicted.

Diagram Explained

The accompanying diagram (No. 1 Plate) illustrates the performance of a properly designed fractionating tower used in conjunction with a conventional shell still. This indicates the results which can be obtained by the application of "Thermo Dynamics" instead of relying on an absorbing medium to attain the partial fractional distillation.

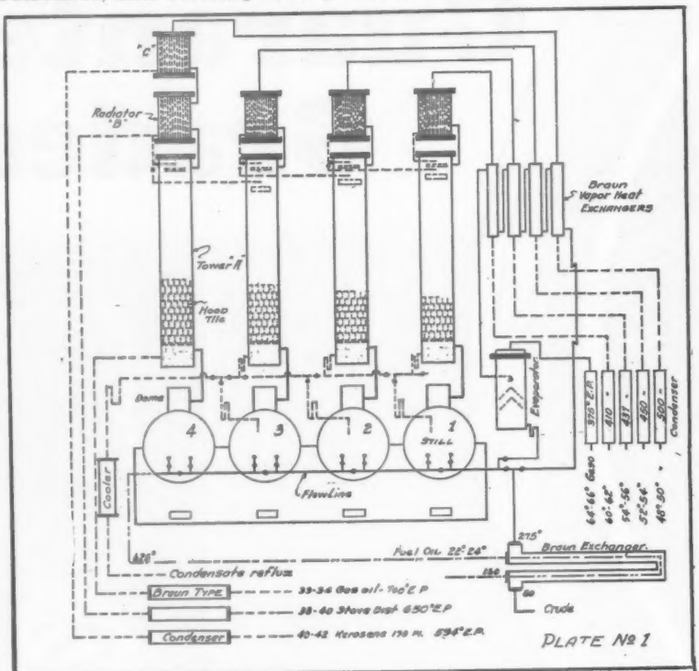
The design of these towers were based on a crude charging capacity to the battery of 3,500 bbls. per day. The towers marked A are 35 feet high. They are of the tile packed type with 7,500 square feet contact surface which is accomplished by the use of chemical spiral tile. The effective absorption of this material can only be realized by its use. The material is very efficient in the separation of the volatile hydrocarbons from the less volatile constituents.

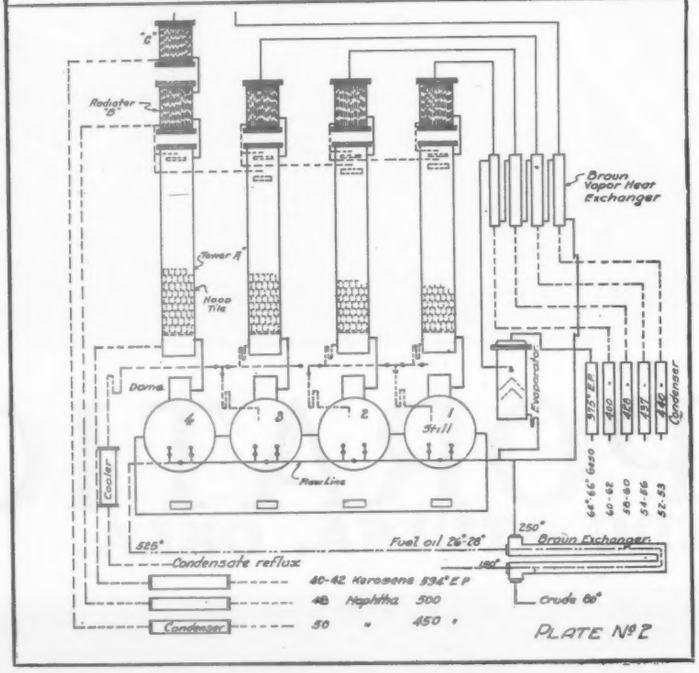
The chemical tile also absorbs the sulphur compounds and the elements of hydrogen sulphide contained in the vapor formed are absorbed appreciably. The presence of these sulphur compounds are apparent in cleaning.

The chemical action of the tile on sulphur compounds in the absorption of same is an asset to the refiner as it relieves partial chemical treatment after the vapor is condensed into a liquid form. The usual offensive odor is negligible in the condensate. Steel has little absorbing power when sulphur compounds are present. The effect of steel is shown when the action of corrosion is present in plates removed for repairs or when the equipment is inspected.

Not only are the tiles an efficient absorbing agent but the application of the spiral for separation—accomplished by the velocity of the vapors—tends to throw the less volatile elements from the more volatile constituents and in this manner effective separation is accomplished which is the desired result in the design of the fractionating towers. Some commercially known types of bubble towers are very similar in accomplishment of this centrifugal separative action. Often times the number of plates is not sufficient to effect fractionation, unless a refluxing absorbing medium is used to separate the mechanically carried elements by the violent agitation due to the vapors traversing the bubble caps. The effective depth of bubble plate to accomplish the results of similar fractional distillation of the hydrocarbons would number about 20. They are used in conjunction with a reflux cooling medium to produce efficient results as obtained by the tile.

The use of a refluxing medium for the absorption of less volatile constituents and to absorb some elements of the volatile vapors is a question which is not taken into consideration in securing efficient fractionation.





Diagrams showing main operating features of fractionating towers used in conjunction with shell stills. Two complete operations are illustrated in the two plates.

Results Obtained

In some cases, the condensed elements absorbed, by the media are carried over into the next still with the volatile constituents, which have been absorbed by the media for fractional condensation. Illustrative of the condition a table is presented as follows:

Still No.	1	2	3	4	5	6
I.B.P.	92	116	804	280	376	400
60	154	190	248	236	392	410
20	178	230	288	350	400	...
30	198	248	320	387	460	...
40	220	268	349	364	...	...
50	240	288	352	378	...	...
60	260	294	360	390	...	...
70	284	318	378	400	...	...
80	318	334	334	410	...	...
90	358	360	404	428	...	...
95	394	388	428	458	...	...
E.P.	420	428	450	476	...	...
Gravity	63.6	56.5	49.8	46.9	43.3	40.1
Pct. @ 410°..	97.5	98	91	80	33.5	11

The table is representative of towers using refluxing system as a cooling media to effect partial fractionation.

Refluxing should be accomplished in a very effective manner in order to secure the ultimate absorption of the less volatile elements, in the proper fractionating tower, within the unit.

Refiners, inexperienced in the use of tile, as an absorbing agent for the effective fractional distillation of hydrocarbons have oftentimes been skeptical as to their efficiency, due to erroneous statement that "channeling of the vapors" is evident. The use of boulders, flower pots, crushed rock and small sized tile, in fractionating towers to effect fractional distillation has been experimented with and the results have been in the authentic statement of "channeling." The use of spiral chemical tile, the 6-inch in diameter and the same proportionate height will not channel or form a coagulation within the tile, due to the absorption of sulphur compounds or other foreign matter in the surface of this material. The statement in regard to channeling has been due to the ineffective absorption material used, and the misapplied aim of chemical tile, as a medium for the effective separation of less evaporative constituents from the volatile hydrocarbons.

Fractional Condensation

The effective results of an absorbent material for the fractional distillation of hydrocarbons has been explained. The further application of the media to function in the design of the fractionating equipment will be termed "Fractional Condensation" which is accomplished in the tower marked "B." The design of the condenser is on commercial principles of a heat exchanger, as the medium performing the fractional condensation of the vapors is an oil, water, or air, as controlled in the condenser. The volatile vapors ascending from the main fractionating tower "A" still contain partial uncondensed fractions which are separated in this condenser "B" by fractional condensation. The condensate leaves the tower condenser and goes to the main fractionating tower below as an absorbing agent for the same evaporative elements, or is gravitated over to the preceding or succeeding tower, as the performance of the towers necessitates the use of an absorbent refluxing medium to accomplish efficient fractionation within the entire system. It was found, however, that the reflux system was not necessary, for an absorbing medium to effect partial condensation of the vapors due to the efficient design of the towers. After the effective absorption accomplished in the towers the vapors further traverse the system for partial condensation, some being used as a heating medium for incom-

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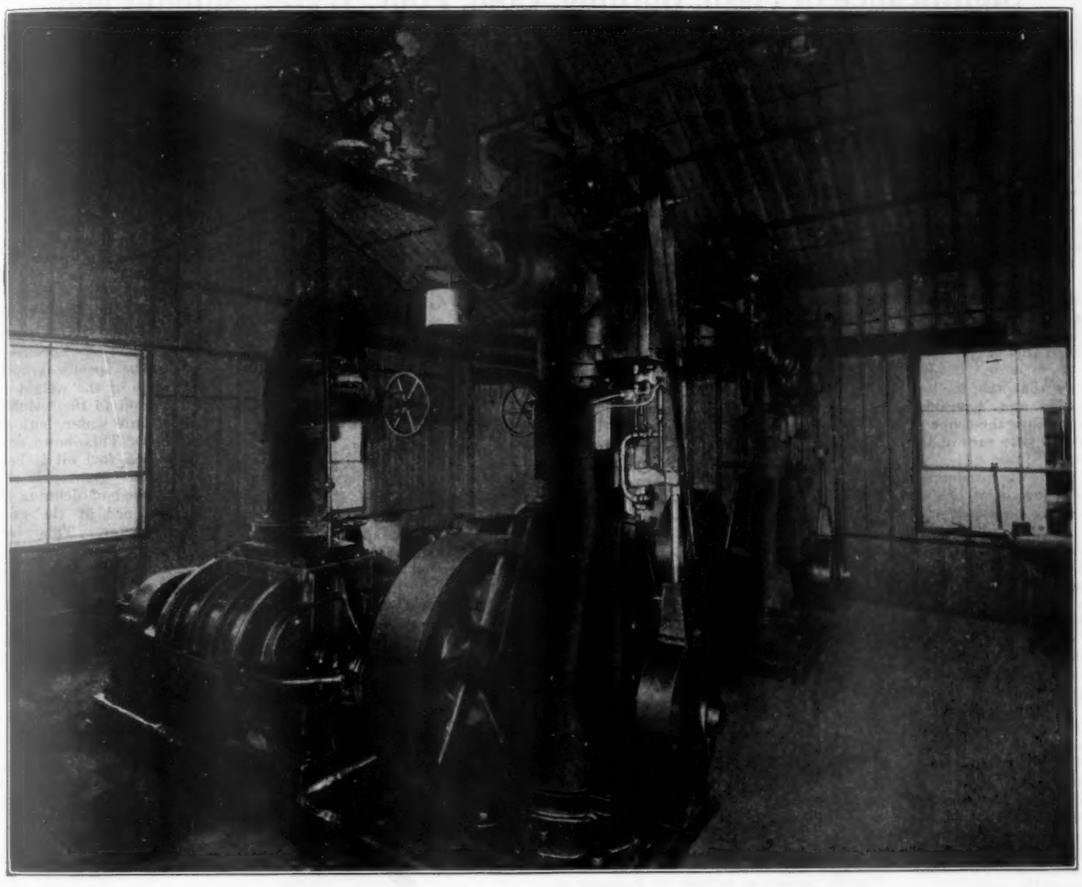
ROOTS



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Meaning of Fuel Oil Specifications

Significance of Flash, Burning, Cold, Pour, Water, Sulphur and Other Tests Together With Use of Calorimeter Explained

By R. L. Walde
Superintendent Lorraine Refining Co., Bristow, Okla.

During the year 1924 there were produced in the world approximately 1,019,000,000 bbls. of crude oil. Of this amount about 720,000,000 bbls. were produced in the United States, and 140,000 in Mexico. Of the total world's production about 50 per cent is represented as fuel oil after the refining process has taken place. In other words, about 500,000,000 bbls. of fuel oil are consumed in the world. Over one-half of this half billion barrels of fuel oil is produced in the United States and the greater share of this is consumed here.

It naturally follows that the fuel oil industry covers a wide and diversified field. In the past few years the scope of this has been widened to take care of the increased production.

In late years, due to the overproduction and the comparatively low price of fuel oil, "cracking" stills have been perfected whereby a part of the fuel oil is converted into higher grade of products, such as gasoline, naphtha and kerosene, which are of greater value than the fuel oil itself.

This "cracking" of fuel oil presents an extensive field. To what extent this will be utilized and what quantity of fuel oil will be used for this must be left to future conjecture. Space does not permit going into detail on this subject of "cracking." This article will be primarily limited to the fuel oil as a fuel.

Principles of Combustion

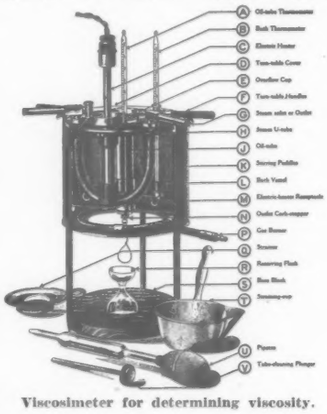
Combustion (burning), in general, is the chemical combining of oxygen and some combustible material. In the case of fuel oil the combustible materials are carbon and hydrogen. Heat increases the speed of this combustion. For example, the decay of vegetable matter is a form of combustion in hich the process is slow on account of the small quantity of heat present. In the case of black powder the rate of combustion is thousands of times faster. This is due to the greater amount of heat present during this process. Black powder is a physical mixture of sulphur, charcoal and potassium nitrate. The elements of combustion are oxygen, a combustible material and a heat-giving substance. The sulphur burns readily, giving heat to liberate the oxygen from the potassium nitrate, which oxygen unites with the charcoal, hence the enormous rate with which the action takes place. As stated above, black powder is a physical mixture. The action can be made more violent by using the substances in a chemically combined form instead of a physical mixture. This is the case in high explosives. The atoms and molecules of the substances are more compact, so to speak, the action is more complete and the rate of combustion is greater, hence the increased violence of high explosives over black powder.

The process of cumbustion in the decay of vegetable matter and the combustion action in explosives are extreme forms but they show that the speed and efficiency of combustion depend upon the amount of heat present and the closeness with which the combustible material is mixed with the oxygen. Cumbustion in fuel oil, then, means the chemical union of the combustible matter and the oxygen of the air, so as to cause rapid increase in temperature.

Fuel oil is primarily composed of numerous hydrocarbons which are chemical combinations of hydrogen (H) and carbon (C). Mixed in with these in very small quantities are combinations of nitrogen (N), oxygen (O), sulphur (S), water H_2O and sediment. Any moisture (H_2O) or sediments in fuel oil are objectionable. They lessen the heating power of the fuel and hinder the free workings of the burner equipment. The sulphur present is also objectionable in that it causes corrosion from the sulphur fumes (SO_3). There is, however, a combustion action in the sulphur, S plus O_2 equals SO_2. The amount of heat formed is very small and does not compensate for its detrimental actions.

Chemical Action of Combustion

The heat of fuel oil is produced by the uniting of the hydrocarbons with the oxygen of the air. Complete combustion of carbon is represented by C plus O_2 equals CO_2. From this we find that 2.7 pounds of oxygen are required to completely burn 1 pound of carbon. The combustion of hydrogen is as follows: H_2 plus O equals



Viscosimeter for determining viscosity.

H_2O, 8 pounds of oxygen to 1 pound of hydrogen. It must be remembered, however, that the amount of hydrogen by weight is very small as compared to the weight of the carbon in the hydrocarbons as found in fuel oil. Since only about 23 per cent of the air by weight is oxygen, it follows that it takes 11.7 pounds of dry air to consume 1 pound of carbon and 34.8 pounds of air to 1 pound of hydrogen.

As mentioned above, there are various hydrocarbons of different chemical construction in the fuel oil. By this is meant various chemical combinations of carbon and hydrogen. For example, a fuel may have a series of hydrocarbons, such as C_7 H_{16}, C_8 H_{20}, C_9 H_{22}, etc., up to C_{22} H_{46} and even beyond this. Letting x equal the number of atoms of carbon and y the number of atoms of hydrogen in each hydrocarbon, complete combustion can be represented by the following formula: $Cx\ Hy + (2x + 1/2y)O = x\ (CO_2) + 1/2\ y\ (H_2O)$. For example: $C_{16}\ H_{34} + 49\ (O) = 16\ CO_2 + 17\ H_2O$.

The above discussion has dealt with theoretical complete combustion. In practice, especially where conditions are not ideal with reference to furnaces, stacks and air supply, part of the combustion may only be partial (C to CO) instead of (C to CO_2). This means a great loss of heat. When complete combustion takes place in a given fuel that consists of 100 degrees carbon, the analysis of flue gas will show about 20.7 per cent CO_2 gas by volume. In the case of ordinary fuel oil when good combustion takes place the average amount of CO_2 in the flue gases is about 13 to 14 per cent.

It is self-evident, then, that in order to determine whether good combustion is taking place, the flue gas must be analyzed.

Assuming that conditions of furnace and chimney are favorable, the amount of air admitted as draft will control the per cent of CO_2 in the flue gases. Insufficient air will bring about incomplete combustion, while too much air will do the same, causing the furnace to be cooled.

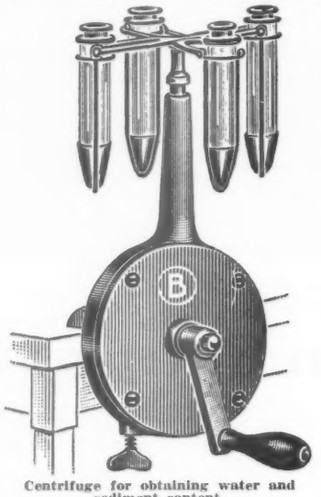
The following table from **A. S. M. E.**, Vol. 30, shows the fuel losses corresponding to the per cent of CO_2 in flue gases:

Pct. CO_2 in Flue Gases	Excess Air	B.t.u. Loss per Lb.	Pct. Fuel Loss
	Pct.		
15.6	0	0	0.0
16	5	75	0.4
14	10	186	1.0
13	18	317	1.7
12	28	447	2.4
11	40	633	3.4
10	54	856	4.6
9	70	1118	6.0
8	93	1435	7.8
7	120	1900	10.2
6	152	2460	13.2
5	198	3205	17.2
4	273	4380	23.5
3	396	6340	34.0
2	635	10150	54.0

Properties of Fuel Oil

Fuel oil is obtained from the crude oils. After all the refined products have been extracted the remainder (residue) constitutes the fuel oil.

As mentioned above, the main constituents of fuel oil are numerous hydrocarbons. Smaller quantities of sulphur, nitrogen and oxygen are also present. The percentages of these various materials differ according to the kind of crude oil from which the fuel oil is obtained. These crude oils differ with different localities. There is a great variation in the gravity and other properties. For example, some crude oils in California have a gravity as low as 12 degrees Baume. Other specifications on this crude are: Flash point, 270 degrees Fahrenheit; fire point, 343; B.t.u. per pound, 19,000. Crude oils in Oklahoma have a gravity as high as 44 degrees to 46 degrees Baume, with 40 degrees flash and 60 degrees Fahrenheit fire.



Centrifuge for obtaining water and sediment content.

In general these crude oils fall into three classes, namely, paraffin base, asphalt base and a mixture of the two. Hence, the fuel oils vary widely in their chemical make up. Fuel oil from the paraffin base crudes will run high in the per cent of hydrocarbons that make up paraffin wax, while asphalt hydrocarbons will be in predominance in fuel oil from the asphalt base crudes.

Specifications

Fuel oil is not ordinarily purchased according to the crude base from which it is obtained but upon specifications which determine its qualities for specific uses more definitely. These specifications are: Specific gravity, flash point, burning point (fire), water and sediment content, sulphur content, cold or pour point, viscosity and calorific value.

Testing of Fuel Oils

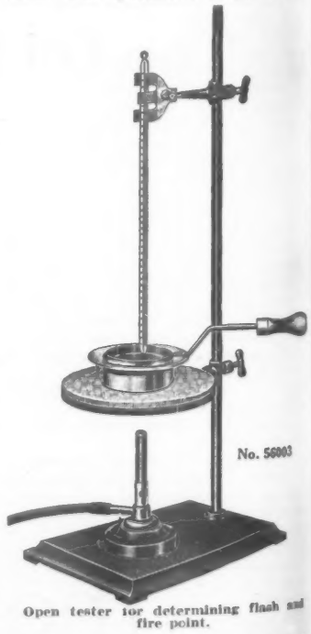
The above specifications are determined by specific tests. Standard apparatus are used to make these tests in order to do away with misunderstandings between buyer and seller and to ascertain its value according to definite standards.

Specific Gravity

The specific gravity of fuel oil is the ratio of the weight of a given volume of the oil to the weight of an equal volume of pure water, both at 60 degrees Fahrenheit. This, however, is not the test upon which fuel oil is bought and sold. The Baume gravity is the generally accepted method of defining the gravity. This is obtained by the use of the Baume hydrometer. This is an arbitrary scale which was first instituted by a man named Baume. He immersed his hydrometer in a solution of salt and water (10 parts of salt and 90 parts of distilled water) and marked the liquid level on the hydrometer zone. He then immersed the same hydrometer in pure water and called that point 10. The space between these marks he divided into ten equal spaces which he called degrees. This marking was then carried out in both directions from this space along the stem of the hydrometer. The following formula represents the relation between the Baume (Be.) gravity and specific gravity:

$$\text{Be. gravity} = \frac{140}{\text{specific gravity}} - 130.$$

In order to obtain standard results the hydrometer should be properly used and read. The hydrometer should be clean and dry, the liquid to be tested should be thoroughly mixed to insure uniform density and temperature, all air bubbles should be removed from the liquid. The hydrometer should be allowed to sink slowly in the liquid, forced slightly below the level at which it naturally floats and allowed to rise to its natural floating position. The temperature of hydrometer



Open tester for determining flash and fire point.

(Continued on Page 150)

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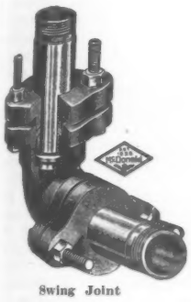
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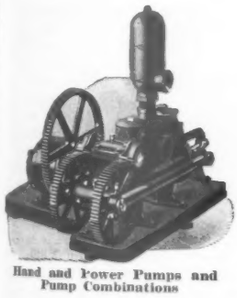
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Board to Consider Fuel Oil Storage

Need for Reserve for National Defense Being Stressed. Advancing Prices An Argument. Lubricants May Be Included

By Charles E. Kern

WASHINGTON, D. C., Feb. 21.—One of the questions that will be brought before the President's oil board will relate to the storage of products of petroleum, especially fuel oil. Perhaps there is no one phase of conservation of national resources and of preparedness for national emergencies so little understood as that relating to petroleum and its products.

The general public is uninformed and the oil industry itself has given it little thought beyond discussions relating to waste and the general policy that began to grow into important proportions under President Roosevelt favoring preservation in a virgin state of natural resources that cannot be reproduced by labor. However, there is a growing realization on the part of men who are primarily responsible for our national defense that conservation of the products of petroleum stands upon a different basis from many other forms of conservation. A forest reserve set aside and protected from fire and other destructive forces continues to increase in value and volume by growth. The forest reserve was one of the earliest subjects of national conservation of natural resources. Talk of the conservation of petroleum followed closely upon efforts to preserve the national forests, but these conservationists overlooked the important difference between these two great problems, the essential difference between which is the fact that the forests grow and multiply and are fixed in place and susceptible to actual measurement, whereas oil is fugitive, its quantity is problematical and recovery is jeopardized by the activity of surrounding owners of land.

Any conservation project relating to petroleum must be greatly modified by these peculiar conditions that affect it. No one knows he has petroleum in any definite quantity until it has been caught and put in confinement. So far as the national defense is concerned, there is only national hazard in depending upon petroleum in the ground. Enthusiastic geologists estimated the petroleum content of Teapot Dome as high as 400,000,000 bbls., and conservative geologists, declaring that they were playing on the safe side, estimated 150,000,000 bbls. as the content of the Dome. When the drilling of this structure was under way sufficiently to permit more accurate estimates, 26,000,000 bbls. was determined upon as probably correct. Whatever may be the estimate that may be fixed by geologists today it does not approach the startling figures that were accepted as reliable and upon which was based estimates for the Sinclair pipe line reaching from Casper, Wyo., 1,000 miles to the Mid-Continent.

Military Opinion on Storage

It is a perfectly safe statement to say that among the men who are immediately responsible for the defenses of the country there is a consensus of opinion that fuel oil supplies should be stored in tanks accessible for prompt delivery and in sufficient quantity to take care of reasonable demands. No war entitled to the name was ever put through in a year. The World War lasted four and a half years and it was one of the short wars. At the present time the fuel oil demands of our Navy are about 7,000,000 bbls. and no estimate of fuel oil consumption by the Navy during a war runs less than 21,000,000 bbls. and, undoubtedly, 25,000,000 bbls. is the safer figure.

The oil industry was astonished when announcement was made in The Oil and Gas Journal that there was a project fully approved by the Navy Department for the storage of 50,000,000 bbls. of fuel oil, more, in fact, than at the time was in storage above the ground both by private owners and by the Navy. The fact is, that was a very conservative estimate of the needs with which the Navy would be faced if confronted by a war lasting two years. The desperate effort of Admiral Robison to get some fuel oil in storage at a time when Japan was making faces at the United States and before the disarmament conference was held in Washington, D. C., was made when the Navy was practically without any supply of fuel oil on the Pacific Coast. Congress had never been awakened to the necessities for a fuel oil supply. It had appropriated millions of dollars for battleships, but could not be convinced of the necessity for a fuel oil supply to run these ships. Since then some people have criticized Admiral Robison because he used money obtained from the sale of oil from the naval oil reserves to purchase storage for the fuel oil the Navy was accumulating from these reserves, although without such storage it would have been impossible to accumulate any supply at all.

National Defense Need

One of the greatest problems looking to true conservation and national defense that will come before the Federal Oil Conservation Board recently appointed by President Coolidge and now beginning to function, will relate to the necessity of true conservation of the petroleum supplies of the nation by putting these supplies in storage instead of depending upon uncertain quantities in the ground.

When this conservation board considers the national defense in this respect, it will discover that such national defense means a great deal more than supplying oil for the Navy. Just as important as is the Navy will be the merchant marine, the railroads and industries generally. About the latest figures obtainable giving the consumption of fuel oil by the United States Shipping Board during 1922, show that the Shipping Board vessels used fuel oil to the extent of 18,229,000 bbls. All vessels cleared to foreign countries, including those of the Shipping Board and of the merchant marine under private ownership, used in 1922 31,692,000 bbls. of fuel oil. It must be remembered that these vessels received bunker oil on their return trips from foreign sources, the exact quantity of which is not available.

This large annual consumption of fuel oil does not tell the entire story of national needs for defense in time of war. The industries of the country must be maintained at such a time when transportation and man power are both in such demand as to hamper efforts to provide fuel. The electric public utility power plants in 1922 used 13,197,000 bbls. of fuel oil and, in the manufacture of artificial gas, there was used, according to the United States Geological Survery, 20,238,000 bbls.

Nearly all of the large industries have come to depend upon fuel oil. The iron and steel industry as far back as 1919, as shown by the Fourteenth Census published in 1923, used 9,701,000 bbls. of fuel oil. Other industries that must be kept going in time of war as well as in time of peace are mining enterprises, which used 3,668,000 bbls. of oil in 1919; cars and shop construction, 3,666,000 bbls.; sugar refineries, 3,306,000 bbls.; smelting and refining metals, 2,946,000 bbls.; foundry and machine shops, 2,171,000 bbls.; paper and wood pulp mills, 2,118,000 bbls.; cement works, 1,860,000 bbls.; ice factories, 1,622,000 bbls.; brick and fire clay products, 1,291,000 bbls., and shipbuilding, 1,033,000 bbls.

To Assure Supply in War

It must be remembered that the United States no longer figures prominently as an exporter of its own domestic production of fuel oil, but that its export trade is augmented by the Mexican production brought into the United States. While Mexico is conveniently close by, that oil is not quite so dependable in time of war as is the oil produced within our own borders. Without that importation from the neighboring republic, American exports of oil would show a very material decrease.

It must not be forgotten that the American people have come to the use very largely of fuel oil to heat hotels, apartment houses and small private residences. While no definite figures are available to show the exact amount of this use, it has been estimated that between 3,000,000 and 4,000,000 private domiciles are heated by the use of fuel oil.

In the manufacture of clothing, or the production of cotton wool and other farm products, a normal yield to take care of the necessities of the people can be depended upon in time of national emergency as in times of peace, because a given amount of labor will produce a given amount of result. The same statement applies to all of the industries that are using fuel oil, but that statement does not apply to supplies of petroleum which are so uncertain in quantity. A failure to

(Continued on Page 156)

METHODS OF MAKING TRANSMISSION AND CUP GREASES IN PENNSYLVANIA

By A. W. Scott

Secretary and Treasurer, Empire Oil & Grease Co., Oil City, Pa.

There are different methods of manufacturing greases and like the manufacture of lubricating oils, the quality varies according to the method and the materials being used. The manufacture of greases is based on the principle of saponification or semi-saponification of fatty matter. Some manufacturers use "waste" and "left over" materials in making their greases, thereby enabling them to materially reduce their manufacturing cost. Other manufacturers use nothing but high class materials and of course their cost of manufacture is correspondingly higher. Our experience has been limited to the use of strictly Pennsylvania materials in our greases as we have specialized on 100 per cent pure Pennsylvania oils and greases. I will therefore confine myself to a description of the method of manufacturing greases as practiced by the company with which I am connected.

Boiled and Set Greases

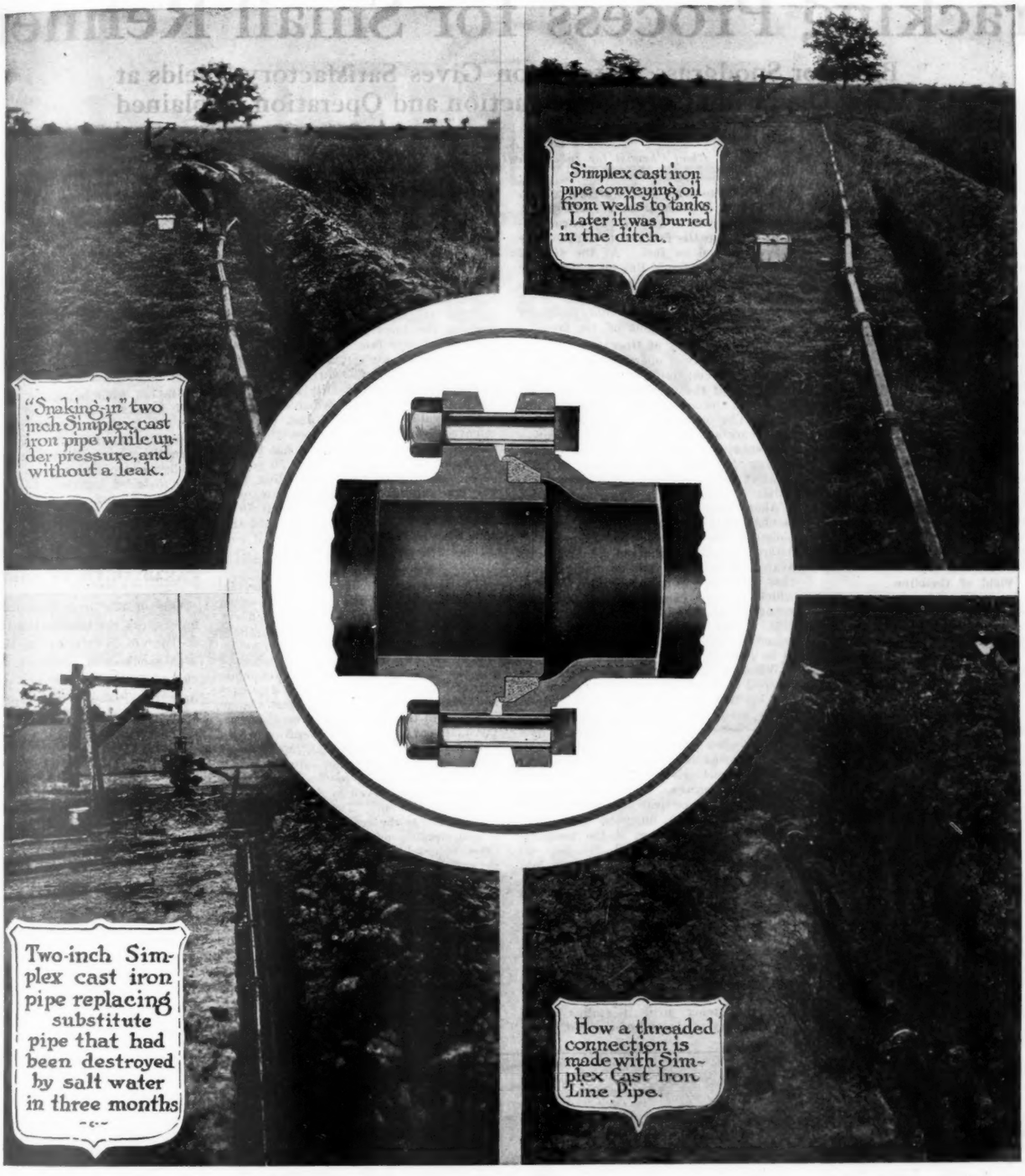
Cup greases are ordinarily termed "boiled" and "set" greases. It is important that the lime used in making cup greases be fat and contain up to 49 per cent to 98 per cent Calcium hydrate and must not contain very much magnesia, as it is a drawback to saponification, causing a separation of small globules of fat. Various kinds of fat are used but we have had the best results from the use of hog fat, horse oil or tallow oil. The kettle being used must be a steam jacketed kettle equipped with a mechanical agitator and paddles. The fat being used is saponified (or made into a soap) by adding 14 pounds of lime to each 100 pounds of fat. These proportions are placed in the steam jacketed kettle and boiled by the use of steam and thoroughly agitated and paddled for about 2½ hours. About this time the mixture becomes sticky and stringy like taffy. A very small stream of neutral oil about the size of a lead pencil is then allow to run into the above mixture until about 150 gallons of neutral to each 100 pounds of fat is used.

It is necessary to exercise great care in adding this oil very slowly; otherwise it will cause the grease to be lumpy. This is caused by the cold oil striking the hot grease and hardening it. At this time we add a small quantity of water and then immediately turn in about 1 inch stream of the neutral oil and continue to add neutral until the grease is thinned down to the proper and desired consistency. Up to this time the contents of the kettle are continuously heated and agitated but the heat is now turned off. The grease is agitated until it cools down to about 130 to 140 degrees temperature at which time agitating is stopped and the grease is ready to be drawn off into barrels, drums or cans. The different consistencies such as Nos. 2, 3, 4, etc., are obtained by adding more or less of the neutral oil just before the grease is allowed to cool. Great care must be taken in adding thew ater above referred to as too much water will spoil the fine gloss and too little water will have a tendency to cause the oil to separate from the grease. Ordinary cup grease is partially destroyed by heating and it is therefore apparent that it should never be used for the same purposes as transmission greases.

Transmission Greases

Transmission and gear greases are used extensively in automobile transmissions and differentials and similar places where they are subjected to more or less heat and considerable friction. The method of manufacture we use is to saponify corn oil or similar fatty oils and then add the quantity of lubricating oil necessary for the desired consistency. The corn oil is put into the kettle and then a solution of caustic soda is added. The proportion we use is 15 pounds of caustic soda to each 100 pounds of corn oil. The same kind of a kettle used in making the cup grease is used and the mixture is boiled and agitated for a considerable time until it is brought to a gummy consistency. A small amount of neutral is then added in order to partially thin down the grease. At this time we add Pennsylvania 600 steam refined stock in a quantity sufficient to reduce the grease to the consistency desired. The resultant grease is a soft, spongy, stringy grease which clings to gears, which will positively not "channel" and which cannot be destroyed by any heat encountered under normal working conditions. The different consistencies of transmission grease are obtained by adding more or less of the Pennsylvania 600 steam refined stock. Transmission grease differs from cup grease in that it can be reheated or even reboiled without impairing the quality.

There are many other kinds of greases made for various special purposes but they are practically all a variation of the methods of making the cup and transmission greases.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Cracking Process for Small Refinery

Bruin or Snodgrass Installation Gives Satisfactory Yields at Low Operating Cost. Construction and Operation Explained

By L. A. Tarbox
Chief Chemist for Independent Refining Co., Oil City, Pa.

For the small refinery with a limited number of crude stills, and consequently a limited supply of gas oil, the "Bruin" Cracking Process presents advantages which are often overlooked when the value of a cracking still is considered. The equipment for this process consists of the horizontal type of pressure still in conjunction with a combination of aerial condensers. This process is sometimes called the "Snodgrass" and sometimes the "Conerty;" but the owners prefer to call it the "Bruin" because the original plant was installed in their refinery, known as the Butler County Oil Refining Co., located at Bruin, Pa.

The overhead expenses of the Bruin process are particularly advantageous to the small refiner. In the first place, the original investment per unit is comparatively small, thus reducing interest and depreciation. The process is very simple in operation, reducing the cost of repairs. No fixed royalty per barrel is charged by the patentees, and so another cost of operation is reduced.

Yield of Gasoline

A point to be considered is the fact that the leanest gas obtained around the refinery is the uncontrollable gas from the cracking plant, which by compression will yield only about three gallons of gasoline per 100 cubic feet. It, therefore, may be used economically as a fuel under the stills with consequent reduction of fuel costs to 9 cents or less per barrel charge, depending upon the fuel used.

Then too, the gasoline yield, based on the gas oil charged, will average 33 to 40 per cent of 437 end point gasoline, which is the approximate yield of any cracking still using the same grade of oil, when the actual yields are not hidden in a labyrinth of misleading figures. When considering the yield from any cracking still, it is very important to get down to the actual yields which are often very obscure.

Also the fuel oil obtained from the bottoms of the cracking still is higher in B.t.u. content per gallon than the original gas oil and the low cold test makes it easily marketable. The fuel oil which is left after the gasoline is removed from the pressure distillate, or pressure naphtha is low in cold test and viscosity, which makes it a very fine furnace oil suitable for the majority of burners.

Still Construction

The still construction is not radically different from any shell type still. The still itself consists of a hammer welded still 10 feet in diameter and 30 feet long, with two manholes on top and one manhole on the front which are opened to permit the still to cool as rapidly as possible before cleaning. The setting of brick and concrete and the insulation are similar to all modern shell stills. Two 12-inch vapor lines, fastened to a header in the center of the top of the stills, connect with an aerial built above the water condensers. The aerial consists of 6-, 8-, and 4-inch pipes acting as a tower in which the heavier gases or entrapped vapors are condensed and gravitate back into the still. The aerial has two distinct outlets—one through two 1½-inch valves which are used to remove moisture from the system when starting the still or to reduce the pressure in case of emergency; the other outlet is through two ¾-inch valves which are located just above the condenser and are used as expansion valves to control the pressure when the still is in operation.

From the condensers the liquid and uncontrollable gases pass into the bottom of a drum in the receiving house, which is kept half full of the pressure naphtha thus acting to some degree as a scrubber. To the top of each drum is connected a 2-inch line which carries the uncontrollable gases to the front of the still where they are used as fuel. At the side of the drum is the liquid line on which there is a meter assisting the stillman to keep check of exactly what the still is doing and when the proper amount has been taken off before shutting off the fires.

Simplicity of Operation

The simplicity of operation makes these stills of special interest because of the reduction of the fire hazard to the minimum and the assurance of uninterrupted runs. The operation consists of heating the charging stock to 120-140 degrees Fahrenheit by exhaust steam coils in the bottom of a tank which is usually of 1,000 bbls. capacity, sufficient to charge three stills.

About two hours before the still is to be charged the steam is turned off and the moisture allowed to settle. Immediately before the still is charged, the water is drawn off from the tank to make certain that no water is pumped into the still which is then charged by means of a swing line thrown into the front top manhole. After charging, the top manhole is bolted to place, and the still is ready to be fired.

When a pressure of 10 pounds is reached it is quickly released through the two 1½-inch valves located at the bottom of the aerial, thus removing all moisture in the system. After the moisture has been removed from the system, the pressure is raised to, and maintained at, 75 to 78 pounds, giving a temperature of 740 to 750 degrees. This temperature is evidently the critical temperature at which wax breaks up with consequent efficient cracking, since, if the temperature is materially reduced, the fuel oil bottoms will stand about the same cold test as the gas oil.

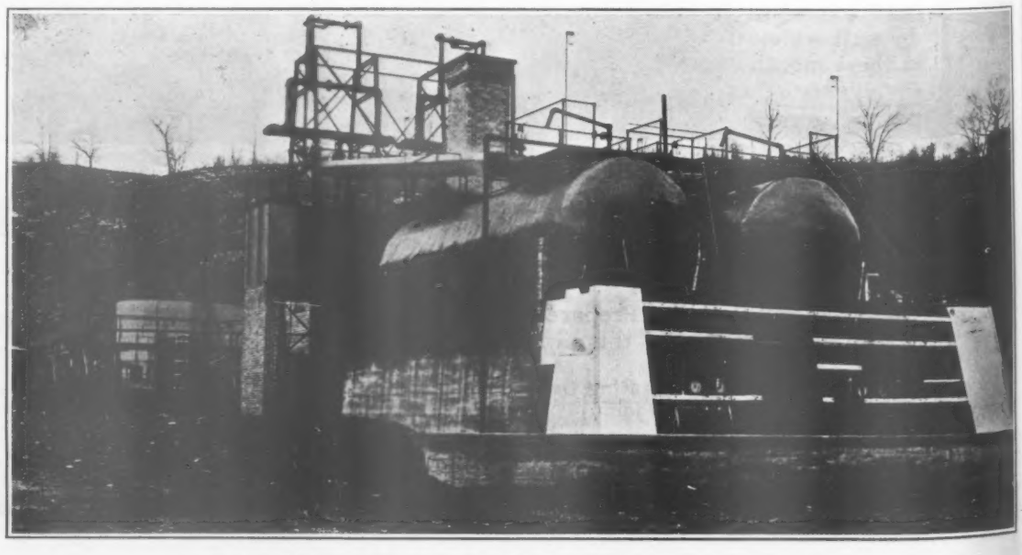
When pressure in the still is at 70 pounds, the two ¾-inch needle valves located between the aerial and water condensers are opened gradually until working pressure of 75 to 78 pounds is reached. The stream will start over about 58-60 gravity when the still is charged with 36-40 gravity gas oil, gradually decreasing until it stands about 52-54 gravity at the end of the run. After the proper amount, usually 60 per cent has been taken off, the fires are turned out and the pressure allowed to reduce to 15-20 pounds, at which time the ¾-inch needle valves are closed, the firebox doors opened, and the still allowed to cool. After the pressure has been reduced to 5 pounds by cooling, the still bottoms are pumped out. The still is "stripped" by opening the three manholes and placing a steam jet or a fan, or both in the manholes to create air circulation. As soon as the still is sufficiently cooled the cleaner goes into the still and brushes down the carbon dust which settles on the sidewalls. When the dust has been removed, the cleaner scrapes the hard carbon off the bottom where it has formed up to the fire line. From 10 to 50 pounds of carbon are taken out, depending upon varying conditions. A complete cycle under ordinary conditions is about 70 to 72 hours from charge to charge, but this time may be considerably reduced if conditions warrant.

Economy in Operation

The simplicity of operation is one factor well worth considering. Too often those of us who are in a small refinery are very apt to try to adapt the methods used by the large ones with big production to our own individual needs, which is just as impracticable as an automobile manufacturer who puts out only two cars a day attempting to use the same system in his plant that Ford uses in manufacturing 3,500 cars a day. An operation which may save the big refineries hundreds of dollars a year does not always mean that the same saving to the small refiner will yield enough even to pay the interest on the investment. There are many instances where the refiner has installed at a considerable outlay of money certain types of cracking still because of a theoretical efficiency, only to find after a few months he is compelled to let it stand idle because of the lack of charging stock, and his inability to buy gas oil at a price that would warrant operating the still. One Bruin unit is capable of handling all the gas oil produced by a refinery running 250 to 350 bbls. of crude oil per day. If a refinery is running only 600 bbls. of crude oil per day it would be much cheaper to install two Bruin units than one units of the latest type with a capacity sufficient to take care of the gas oil produced by a refinery running 900 to 1,000 bbls. of crude oil. This is a point apt to be overlooked

The disadvantages of the Bruin process are (1) Time lost in cleaning; (2) the heat lost in pumping out. From an engineering point of view this latter is a very important factor, but in actual operations the operating costs compare most favorably with any other process.

On the other hand, the advantages are (1) a maximum yield of gasoline from gas oil (2) a minimum of fire hazard, (3) simplified operation, (4) low cost of construction per unit, which can be materially reduced where two or more units are installed together, (5) the necessity of constructing only a unit of sufficient capacity to meet individual needs of the average refinery with the resulting minimum investment.



Bruin cracking stills complete at the Ohio Valley Refining Co., St. Marys, W. Va.

CANADIAN CO. IN NORTH TEXAS

One of the large Canadian oil distributors, the British-America Oil Co., Ltd., of Toronto, is entering the Mid-Continent as a producer of crude oil, and has purchased about 500 bbls. a day production in north Texas. The company plans to acquire crude from its own wells or by purchase to the daily capacity of its 2,500-bbl. plant at Toronto, and to ship the crude by tank car from Texas to Canada, marketing it there. The British-American Oil Producing Co., owned by British and American capital, will operate for the parent company in the Mid-Continent. Walter K. Campbell will be in charge.

FEBRUARY MEXICAN OIL TAXES

February schedule of taxes on oil production in Mexico fix the rate on light crude at 25.4 cents, on fuel oil at 23.5 cents and on heavy crude at 13 cents a barrel, unchanged from January. Export duty is also unchanged, making total February tax on light crude 33 1-3 cents a barrel, on fuel oil 30 cents and on heavy crude 18 cents.

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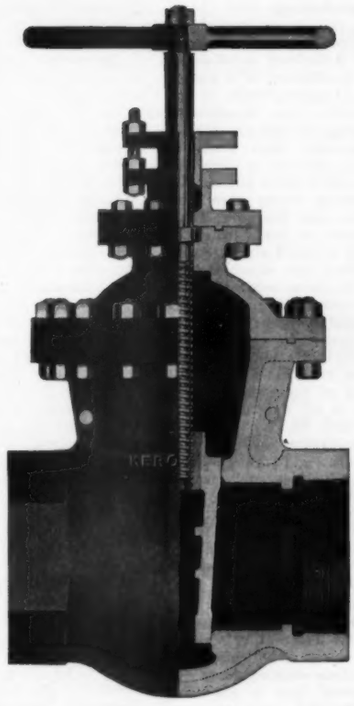

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Why Of The Personnel Department

Purpose is the Building and Maintaining of an Organization to Carry on Work Assigned it

By Ralph O. von Thurn
Superintendent of Personnel, Cosden & Co.

Washington Irving, as a young man, was called on to the carpet by the faculty of Columbia University and fired because of his general worthlessness and his poor prospect of becoming any better in the future. Both the faculty and Washington Irving had cause to regret the action later. But the point is—so far as the university was concerned—he was fired and none of the credit for his success could be claimed by Columbia. After all, the success of any company is but the accumulated success of its personnel. If care is used in the purchase of materials to insure excellence of quality and suitable price, it is even more necessary to use care in the selection of men, who, for long periods of time, will be called upon to do the purchasing.

Tests made in the Army during the World War indicate that the average intelligence of the American manhood is only equal to the intelligence of a normal 14-year-old boy. If this is true, it possibly explains many of the blunders we have observed among the folk "in the old home town," whatever that town is. Whatever the facts, there is no organization in existence which does not have a hard time recruiting young men who have at once brains and ambition. There may be some places in every company which can be filled by good strong backs, sans everything from the shoulders up, but the number of places which require a considerable amount of gray matter exist in such numbers that the employment office the country over are searching, with discouraging results most of the time, for men capable of accepting the responsibilities of their initial work after employment, to say nothing of their ability to grow and fill the next job higher. Many companies keep in touch with the senior classes in the colleges and universities and enlist such as can be induced to enter their employ. A rumor is now current that an attempt is being made to influence college freshmen to pursue certain courses which will make them good material for responsible positions in a well known industry.

The Value of Records

Companies employing between 500 and 1,000 men frequently find that it is necessary to employ as many as 300 men each year to maintain their working force. A recent survey showed that it has been necessary to interview approximately three men for each one hired. If only a few minutes is spent with each man interviewed, the sum total of time spent on this work is enough to occupy most of one man's time. The time element involved precludes the possibility of the employment work being done by the chief executive.

Formerly in many companies, the employment work was relegated to the foreman. It would be folly to say that no foreman is capable of picking good men, but it would likewise be folly to think that all foremen could do the work successfully. Experience has proved that many ills may exist in plants where no uniform methods of employment are practiced. All of the ills, from the practice of selling jobs to the firing of an employe because he was better than his boss, were possible when employment of men was a function of the foreman. Without a central office containing records of the employes, many good men have been wasted on pick and shovel jobs who would have been more successful in an office, or in a craft in another department.

During the war a young man, when asked what his occupation was, insisted that he was an adventurist. The man writing the record appealed to his captain for help. After some questioning, the captain said his subordinate, "Put him down as an adventurist." While it is true that the first work the adventurist did in defense of his country was the lowly toil of cutting wood for the cook, his record was not lost and as a result the story of the young man's experiences in the Army read like a tale from the Arabian Nights. A recent resignation in a well known organization caused considerable worry until it was pointed out by the employment office that a man who had been employed several weeks previously had the necessary qualifications to fill the vacancy. Had that man been known only to a single foreman, doubtless his company would still be seeking for someone to occupy the position.

Early Day Methods

Agents for one of the best makes of automobile are showing a list of auto manufacturers who at one time or another have built cars in America. The names of those now out of business are marked off. A casual glance at the sheet would lead one to believe that all are marked off. Looking more closely, one sees the names of the comparatively few still being built. The economic trend has been responsible for the failure of many, but a history of the methods employed in the early days of the automotive industry is illuminating.

An out of town man greeted a workman from one of the automobile factories several years ago. The workman had been his byhood friend. To his surprise, the workman said, "You are mistaken, my name is not Smith" and before the other recovered from his astonishment, Smith was lost in the crowd. That night Smith hunted up the out of town man at his hotel and explained. Anyone caught trying to learn anything about the business aside from his appointed work was summarily fired. Smith was ambitious and eager to learn, so every few months he quit the company and hired back under a new name and was fortunate enough to have been assigned to most of the departments in which he was interested. Later the company went out of business because no one could be found who could fill the homes of the man who for years had headed the company.

One of the largest truck factories in the world came near being permanently closed because of falling off in sales due to trouble with the truck which the engineering department was unable to remedy. For years the entire responsibility of design and manufacture was upon the shoulders of the man who originally designed the truck. His untimely death came just after a change in design of the motor and transmission. His failure to train someone to follow up behind him came perilously near pauperizing hundreds of people who had invested in the company's stock.

Built Own Personnel

A manufacturer in Illinois was once asked if he could make a trip of several weeks' duration, in the furtherance of some community project. Without hesitation, he said "Yes," and in order to get the jump on the other bunch, I would suggest we start tonight." The committee who had waited upon him, was somewhat surprised at his ability to leave his business on such short notice. Later he confided that several years earlier his physician had told him his years were numbered. He had immediately started to organize his business in such a way that it would carry on successfully after his death. He found that his work was as much a work of education of certain men as of organization of them. His work had been so well done, that had he never returned alive, his factory would have continued to operate at a profit. His closing remark is worthy of attention. "My business and health have both improved since I commenced to get ready to die." His personnel work was so well performed that the business looked after itself.

Not infrequently, some one asks if the foreman does not lose caste in the eyes of his men by virtue of the fact that some one else employs them and fires them. Few foremen who possess qualities of leadership ever need to raise the question. In some cases, it is necessary to take measures to teach the workmen to respect the authority of the foreman. Story and jest, have, in the past, pictured a rough type of foreman who from time to time fired some one to show the world who was boss. The grown up "Mickey McGuires," while few in number, are not all dead yet and here and there one gets to be a foreman with consequent unreasonable demands.

The Kangaroo Court

In the cases where the "Mickey McGuires" are the ones in the ranks causing trouble for the foreman as well as where the case is reversed, some means must be devised to correct the improper conduct. Many plants have established a sort of Kangaroo Court in the employment office, where complaints are made and subsequently witnesses called and cases argued pro and con.

Where the case is one in which a foreman appears against one of his men, the man is usually given some assistance in presenting his case, on the theory that if he is of a retiring type and poor talker, he may not do himself justice in presenting his case. In this court, which sounds very formal but where the procedure is very simple, the case is settled, and the penalty, if any, fixed. The fact that all cases are handled in a certain place guarantees uniformity of method and penalty. Records of these cases, together with the counsel of the chief executive in the organization, develops precedent from which may be published rules for the guidance of new employes. From time to time, policies may be instituted by the executive but in no small degree do they come out of the experience gained from handling discipline cases.

No matter how carefully men are selected, placed, trained, disciplined and promoted within the organization, if they are to be ultimately successful they must both give much to and receive much from the community. There is an occasional recluse who rises to a position of power, but, ordinarily speaking, men who accomplish worthwhile things, associate widely with good people. Many men are in business with no other idea than that to make money for themselves—their motives are purely selfish, but in order to make money, no matter how selfish they are, they must, in their business, serve some reasonable need in the community. No man is ordinarily capable of recognizing reasonable, normal needs in his community unless he is a reasonable, normal citizen.

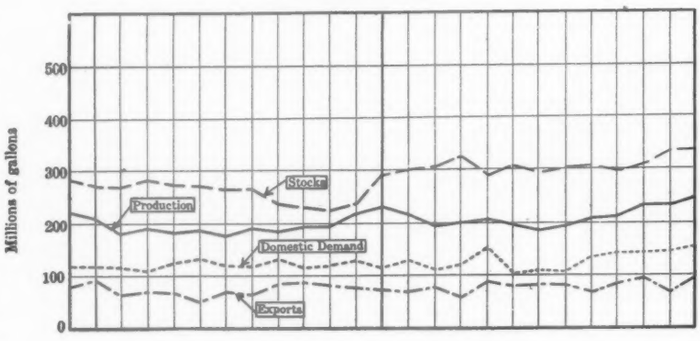
Good Management

In the Ordinances of 1787, appeared the following words. "Religion, morality and education being necessary for good Government, schools and means of education shall forever be encouraged." Good Government in a nation means the same as good management in a company. Good management in a company is as much dependent upon religion, morality and education as is good Government. On the surface, this may not seem true. Yet, where is there a company which could operate if its employes did not live fairly close to the teachings of the Christian religion? Disregard the injunction—"Render to every man his due"—and employes can take thousands of dollars from their employer which they never earned. "Thou shalt not steal" has meant the difference between profit and loss in many organizations. Morality has saved homes and happiness. Where there are homes and happiness, there are contented, willing minds, with little to keep them from their work. Work well done means continuous employment—all of which usually means permanance in the community and low turnover among the employes and thereby greater efficiency. Character, coupled with education is a combination hard to beat. That time spent in the development of character among employes is time well spent for business, is axiomatic. Ordinarily, once such work is undertaken, there is much of it to do and should be so provided for that it may be carried on without interruption as one of the regular functions of the company.

An employe of a large company recently made milk goats his hobby. He succeeded in producing what is probably the champion milk goat in America. A boilermaker was found whose hobby was psychology. Another man spent hours of his time developing a beautiful lawn with the finest kind of landscape work. Tomatoes were the special hobby of a middle-aged workman, who took pride in showing his vines to frequent visitors who had never before seen tomato vines grow

(Continued on Page 170)

KEROSENE



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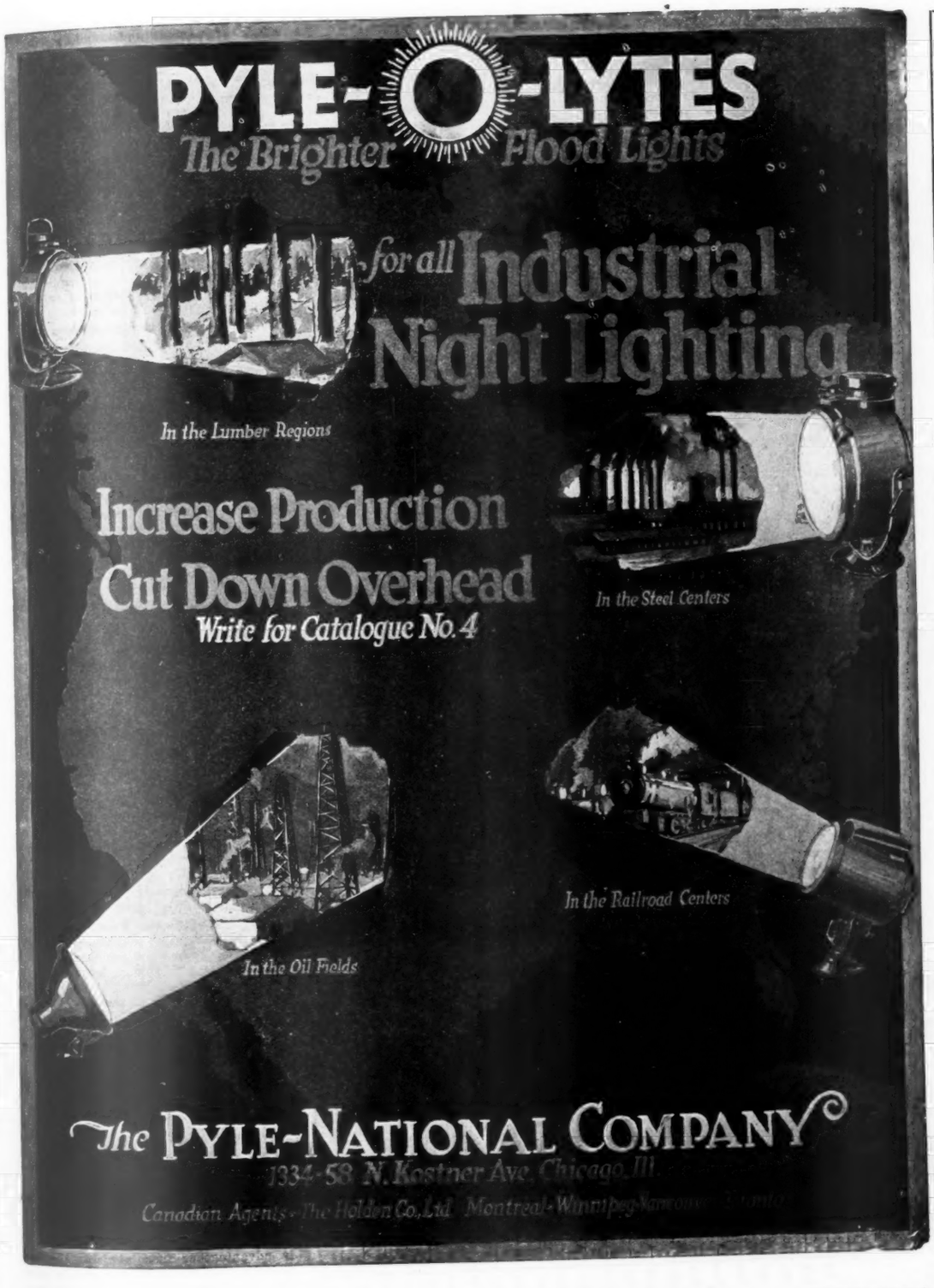

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Modern Processes for Treating Oil

Methods for Making Gasoline, Kerosene, Lubricating Oils and Wax Suitable for Markets Are Explained. Cracking Adds to Problem

By A. P. Bjerregaard
Technologist, Empire Refineries, Inc.

The various products produced from crude oil by distillation are very rarely suitable for use without a final refining process with chemicals of various kinds. These refining processes are usually called "treating" processes and it is this class of operation which is to be discussed in the present article.

There are four general classes of petroleum products produced from crude oil which need to be put through these refining or treating processes.

1. Light products such as gasoline and naphtha.
2. Kerosene and similar burning oils.
3. Lubricating oils of various kinds.
4. Paraffin wax.

The methods of producing these various products up to the point at which treatment is given will not be discussed in this article.

Light Products

There are two classes of light products which will be considered here and which require somewhat different handling in the treating process. In the first place, there are the products produced directly from the crude; and, in the second place, there are the products produced by the various cracking processes from intermediate heavier products.

The usual method of treating the light straight run products is to agitate them with strong sulphuric acid (66-degree acid, which actually has a strength of 93.2 per cent sulphuric acid). This agitation is commonly carried out in agitators, which are tanks with conical bottoms, by means of a blast of air introduced into the bottom of the cone. The amount of acid required varies somewhat with the character of the distillate which is being treated and this variation may range from one pound or even less to as much as 20 or 30 pounds of acid to the barrel, but most commonly one pound to two or three pounds are used. The large amounts are only used in exceptional cases where the distillate is unusually bad in odor or contains very high amounts of sulphur or other deleterious substances. After the acid has been agitated with the gasoline for a sufficient period of time, which will vary somewhat with different distillates from 15 minutes to two or three hours or in the case of very bad products to six or eight hours, the acid is permitted to settle and is drawn off from the bottom of the agitator in the form of a dark colored sludge acid.

The more completely the sludge acid is removed from the distillate at this stage the easier it will be to carry out the subsequent operations.

Control of Temperature

In all treating operations on light oils with sulphuric acid it is very important to control the temperature of the oil undergoing treatment. The best temperature is between 70 and 90 degrees Fahrenheit. With cold oils, the acid sometimes reacts slowly and unsatisfactorily, and with very hot oils a discoloration is liable to take place instead of a decoloration. If the finished product need not pass the doctor test or if it is produced from a crude which gives products that do not yield a positive reaction under that test, the oil is simply neutralized by agitating a small amount of a caustic soda solution with it, after which the caustic is permitted to settle and drawn off and the oil is then drawn off into settling tanks, known as bleachers.

If, on the other hand, the distillate responds positively to the doctor test and it is thus what is called "sour," and it is required to produce an oil which will not respond to this test, that is, that it shall be "sweet," then instead of a solution of caustic soda, it is necessary to use a solution of lead oxide (litharge) in caustic soda. This solution is called the "doctor" solution. This doctor solution is introduced into the agitator, with the oil, the amount varying according to the quality of the oil being treated from one-half gallon to two or three gallons per barrel, and in some cases where the oil is extra bad additional litharge is also introduced. These substances are then agitated well together by means of a blast of air, until the chemical reaction which goes on has removed the "sour" doctor test, after which the spent doctor solution is settled and drawn off and the gasoline or other light product is drawn off into settling tanks or bleachers. The doctor solution does not remove any sulphur from the oil, it only changes the nature of some of the sulphur compounds present so that they no longer respond to the doctor test.

The immediate effect of the doctor on the oil is to discolor it and sometimes this discoloration does not coagulate or break up of itself and it then becomes necessary to add some coagulating agent to the mixture in the agitator. The best known agent for this purpose is free elementary sulphur, which has the effect of causing the yellow discoloration in solution to break down into a brown precipitate that separates from the oil and finally turns black, leaving the oil clear and colorless.

Under some circumstances very finely ground Fuller's earth can be used for the same purpose as the sulphur and in few cases finely ground litharge has been found advantageous for the same purpose.

Care in Use of Sulphur

Naturally, if sulphur is used in this operation, the total sulphur content of the oil is liable to be increased unless great care is exercised in the use of this substance, and this increase of sulphur is exceptionally bad because it gives the oil a corrosive effect on copper with which it may come into contact.

Hydrogen sulphide in solution in gasoline also gives the oil a corrosive effect on copper, but this is readily removed by washing the oil with a solution of caustic soda. Free elementary sulphur, on the other hand, cannot be removed by washing with caustic soda. It may, however, be removed by washing the oil with a concentrated and strongly alkaline solution of sodium sulphide.

A modification of the two above described processes consists in agitating the oil with the chemicals by mechanical means and this can be accomplished by drawing the oil and chemicals out at the bottom of the agitator through a pump which is usually a centrifugal pump, and sending it back into the top of the agitator. By this means losses of light products can be avoided and the whole system can be kept closed and even under slight pressure.

Above has been described the sweetening process which has been in use in the oil industry almost since its inception and it is still in very extensive use.

As an alternative or improvement on the so-called sweetening process by means of the doctor solution, there has been introduced recently into the petroleum industry a process for accomplishing the same purpose by means of calcium or sodium hypochlorite solutions.

Hypochlorite Solution

The calcium hypochlorite solution can be prepared by mixing bleaching powder with water, but this is not a good way and it is preferable to prepare the hypochlorite solution in the refinery itself by passing chlorine gas into a solution of milk of lime or of caustic soda. The chlorine is purchased in steel cylinders in the liquefied form, and by means of suitable valve arrangements, furnished by the manufacturers of the chlorine, the liquefied chlorine is released in the gaseous form without pressure into lead pipes which conduct it to the bottom of the tank containing the lime in the form of milk of lime or the caustic soda in the form of a solution.

The calcium hypochlorite made from the lime is permitted to settle and the clear solution of calcium hypochlorite is made use of. The sodium hypochlorite will be clear without settling.

The hypochlorite solutions must be alkaline and it is not permissible for these solutions to become acid at any stage during the course of their manufacture because acid solutions of hypochlorite decompose with great rapidity and lose their power as sweetening agents for petroleum products.

The hypochlorite solution may be introduced into the agitator along with the oil and agitated either with an air blast or by pumps as above described, or by continuous process as described below.

Hypochlorite actually decreases the amount of sulphur in the oil, while yielding a doctor sweet product.

Continuous Processes

Various styles of continuous processes have been devised and put into use which do away with the old style agitator. In a general way most of these processes involve the passing of the oil along with the chemicals through pipes to mix the two together and then discharge of the mixture into a closed tank of sufficient capacity to permit the heavy chemicals to settle to the bottom while the oil floats to the top. There are two outlets to this settling tank, one at the bottom for permitting the heavy chemicals to pass out; the other at the top for permitting the settled oil to pass out. These continuous processes are very advantageous because the contact between the chemicals and the oil can be made more intimate than in the agitator and, therefore, the processing can be hastened. These continuous processes are also highly advantageous in minimizing the loss of light constituents by evaporation, since they are closed systems. As many mixing pipes, each with its settling tank, are required as there are chemicals to be used and water washings to be made.

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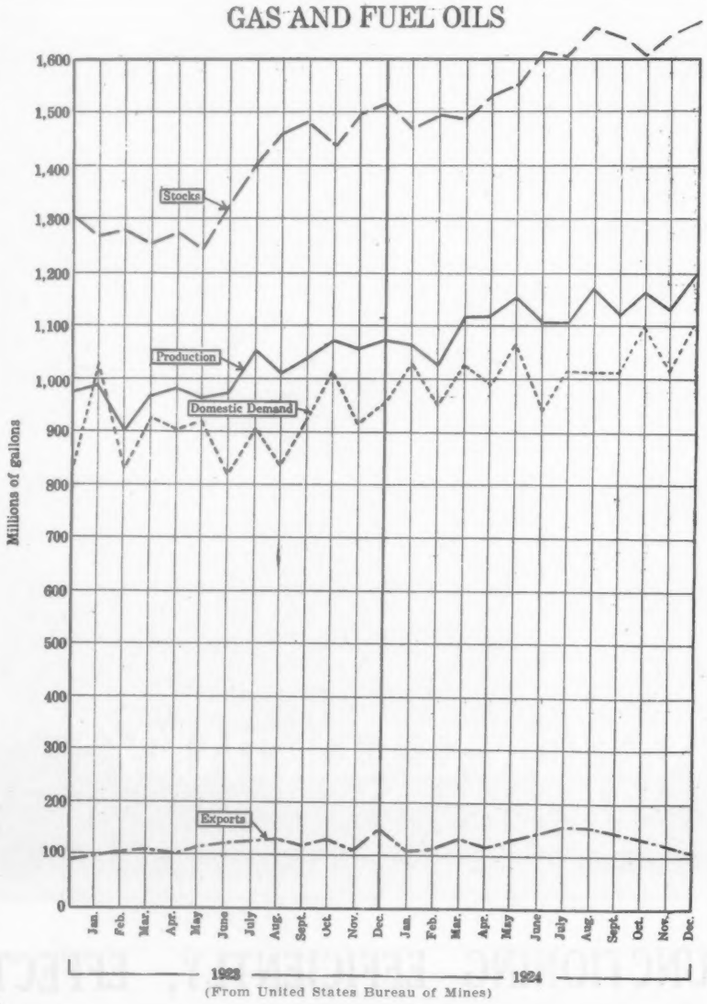

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What Bureau of Mines Does for Refiner

Research Work by Government Scientists of Great Value in Helping Towards Elucidation of Industry's Problems

By H. H. Hill*
Assistant Chief Petroleum Engineer, United States Bureau of Mines

What Has Bureau of Mines to Offer Refiner?

The accompanying article, which was prepared at the request of The Oil and Gas Journal for publication in this issue, answers this question. In the technical end the Government's bureau has research facilities available to the plant operator which will often aid in the solution of practical problems. From time to time the bureau issues bulletins covering exhaustive investigations made of all phases of production, refining and marketing which are of special interest to the refiner. There are also the monthly reports covering refinery statistics and special surveys.

These and other features of the bureau's service to the refiner are explained by Mr. Hill.

The interdependence of the different branches of the petroleum industry is often overlooked yet they are so closely related that there is a difference only in degree as to the interest in problems that relate to one particular branch of the industry or the other. The producer, for example, is interested in the processes used by the refiner and the yields of the different products that he secures, for the results obtained by the refiner have an important bearing on the demand for and price of crude oil. The refiner is interested in the activities of the producer for he is anxious to know where he is going to get the crude oil for his refinery and what he will have to pay for it. The natural gas gasoline manufacturer is interested in the activities of both the producer and refiner for he is anxious to know whether he will be able to get enough casinghead gas to keep its plants in operation and how much of his output he will be able to sell to the refiner. The marketer is interested in the activities of all three for he is anxious to know whether the producer will be able to furnish the raw material necessary to supply the refineries and gasoline plants and whether the refiner and natural gas gasoline manufacturer will be able to make the requisite quality and quantity of products to satisfy his trade. Likewise the producer, refiner, and natural gasoline manufacturer are interested in the problems of the marketer as they are dependent on him to dispose of their products.

The Refiners' Interest

It is difficult, therefore, to select problems upon which the Bureau of Mines is working at the present time that are of interest only to the refiner. He is anxious to obtain a supply of crude for his refinery and therefore is doubtless interested in the work that is being done by bureau engineers on drilling and producing problems for any work that results in an increased recovery of oil is of value to him. He is anxious to know more about the crude oils that he can obtain for his refinery and is therefore interested in the work that is being done by the bureau chemists in determining the characteristics of crude oils from all sections of the country. He is particularly anxious to increase the yield and quality of the more valuable products of his refinery and is doubtless interested in the work being done by chemical engineers and refinery engineers of the bureau on fractional distillation, and on the preparation of lubricating oils from crudes that heretofore have not been considered satisfactory for that purpose.

If the refiner is using natural gasoline for blending purposes he is interested in the work of bureau engineers in improving the quality of that product. If he is using natural gas for fuel in his refinery he is doubtless interested in the work of the bureau on reducing leakage losses in natural gas transmission lines. In short, the refiner is no doubt interested in any work that will help to conserve the supply of crude oil and will result in more efficient methods of refining and in more general utilization. He is also anxious to know what the other refiners are doing and the quality of products that will be demanded by some of the more important purchasers of petroleum products. He is therefore interested in the refinery statistics published by the Bureau of Mines and in its work on specifications for petroleum products.

Refinery Statistics

The refinery statistics published monthly by the Bureau of Mines constitutes one of its most important pieces of work from the standpoint of the refiner. These statistics give the output of the refineries of the country and stocks of the various products. The compilation was started in 1917 as a war measure when it became necessary to know the production and stocks of refined products in the various refining centers of the country so that plans could be made for supplying gasoline and lubricating oils for the airplanes and motor transport and fuel oil for the Navy. These statistics proved so useful to the refiners that at the close of the war the Bureau of Mines was asked to continue this service to the industry. As a result, the work has continued and monthly reports are issued giving production, consumption and stocks of the various petroleum products for the different refining districts of the country. Each year an annual report is published giving the totals of the various products for the year.

The time element in the publication of such data is of prime industrial importance: Therefore, the bureau arranged to have the figures for the California refineries sent to its San Francisco office where they are tabulated and published several days before it would be possible to have them released by the Washington office. This arrangement also aids to some extent in getting out the figures for the remainder of the country as it is not necessary for the Washington office to compile the figures from the individual companies of California before putting out the statistics of the country as a whole.

Cause of Delay

The bureau has frequently been criticized for the delay in getting out the monthly report on refinery statistics. In spite of all efforts to expedite this work it is not possible to release the report until about 35 days after the close of the month to which the figures apply. This is not due to slow work on the part of the bureau nor should the companies be criticized for in a number of cases they do not have the final figures available until 25 or 30 days after the close of the month. The companies are anxious to furnish the bureau with the same figures that they use in their business and for that reason they do not submit their reports until the final figures are available. Although the figures would be more useful to the refiner if they could be released a few days after the end of the month to which they apply, they are used for so many purposes that accuray in their preparation is as essential as speed. It is believed, however, that the figures are issued in time to show the general trend of the refining industry. The bureau has received excellent cooperation from the industry in this work and it is hoped that it will soon be possible to receive reports from every refinery in the country.

Specifications for Products

Another activity of the Bureau of Mines that brings it into close touch with the refining industry is the work on Federal specifications for petroleum products. The Bureau's representative is chairman of the technical committee on lubricants and liquid fuels of the Federal Specification Board. This committee is charged with the duty of recommending specifications for petroleum products for use by al lthe Government departments. It aims to recommend specifications that are entirely practical in that they will insure a good grade of products for the Government departments without necessitating special treatment in the preparation of the products in the refineries. In order to keep in close touch with the refining industry and with the important industrial consumers the technical committee on lubricants and liquid fuel consults with an advisory board consisting of representatives of various associations of the oil industry and of several engineering and technical societies.

These specifications are quite important to the refineries not only from the standpoint that the Federal Government is a large purchaser of petroleum products but chiefly for the reason that they have been adopted by a number of the State and municipal Governments and by several large industrial consumers. The specifications for United States Government Motor Gasoline, for example, is very widely used as it has been incorporated into the laws of several States and into ordinances of several municipalities and has become so important in the refining industry that market quotations are published each week and a number of the companies advertise that the gasoline they are selling complies with the specification for United States Government Motor Gasoline.

Semiannual Gasoline Survey

For the past five years the Bureau of Mines has been making a semiannual gasoline survey as a part of its program of keeping in touch with the quality of gasoline that is being supplied to the commercial trade. Samples of gasoline are collected from representative cities of the country in order to obtain an idea of the quality of gasoline that is marketed in the country as a whole. The information thus obtained is very valuable to the committee on specifications as the analyses show without question whether or not the specification for Government Motor Gasoline is out of line with the average quality of gasoline that is being supplied to the trade.

The first gasoline was made by the bureau in 1917 when samples were collected in several of the important marketing centers. In 1919 a complete survey was made in which a total of 851 samples

(Continued on Page 122)

*Published by permission of the Director, Department of Interior, Bureau of Mines.

NEED FOR PRODUCTION IS SHOWN BY ADVANCING CRUDE OIL PRICES

By N. O. Fanning

NEW YORK, Feb. 21.—The sharp advances in prices of crude oil and oil products since January 1 has opened the question as to whether the world is approaching a shortage of oil or not. In many cases the advances themselves have conveyed the impression that a shortage exists today. This, however, is contradicted by the high rate of crude oil production throughout the world together with the large stocks of oil in tanks.

On the other hand advances in prices such as those which have taken place in a period of less than six weeks point to a condition which exists, not to some vague expectation as to the future. The condition in question is that production, as large as it still is, tends lower, while crude oil, outside of the amount held in tanks of companies financially strong, is scarce and in demand. The demand is coming from big refining companies having large stocks and from small refiners who have practically no crude in storage and must buy current needs in the open market.

Why Companies Buy

Many may wonder why companies having large stocks of crude on hand at refineries or in field storage should be active competitors for current production at rising prices. Stocks of crude petroleum outside of refineries amount to about 350,000,000 bbls., a high record in the history of the oil business. This roughly, is enough to supply the country's requirements for about six months to come. The size of these stocks is important, however, only with relation to the balance between current production and current consumption.

Up to the close of 1924 withdrawal from storage, indicating an excess of demand over supply, was negligible. Price advances, however, have taken place entirely since that time. It is, therefore, fair to believe that the price advances have been based upon conditions or information known to the principal oil interests of the country which have developed since January 1, although they may have been in the making before that time.

Companies which have national or international marketing organizations are in close touch with the markets and are able to estimate the probable requirements for oil in the immediate future within narrow limits. These same concerns having representatives in the principal producing or prospective producing areas, also know fairly well what are the possibilities of bringing in new production to offset the natural decline of existing pools.

Broad View Necessary

The existing supply of oil above ground may not seem so large to companies handling 15,000,000 to 73,000,000 bbls. of crude oil in their domestic refineries alone, and that must assure themselves of an adequate supply of oil to protect their customers.

(Continued on Page 178)

Beckwith *Check Valves*

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Distinctly a Kelly and Jones product, the Beckwith Check Valve is typical of the many oil country valves and fittings that have found favor with oil producers, refiners and marketers wherever quality with reasonable cost dictates the buying policies.

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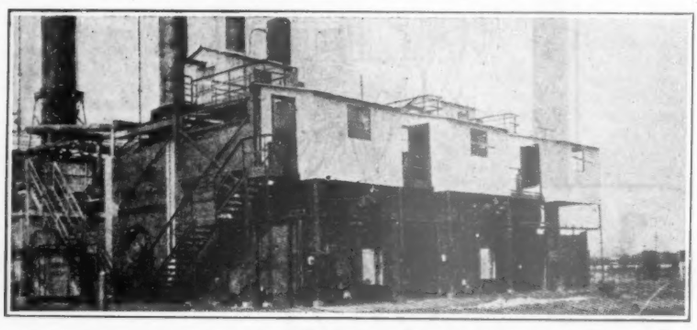
Jenkins Cracking Process Described

Outstanding Feature of Latest Developed Standard Unit is Manufacture of Finished Product Without Re-running

Experimental work on the Jenkins cracking process under actual refinery conditions dates back to 1916. Improvements and changes have been made, the latest development being the standard unit.

The outstanding feature of the standard unit is that the cracked gasoline is refined within the unit itself giving a water white product that answers export specifications with no rerunning and requiring only the usual doctor treatment. Additional equipment has also been added for complete recovery of recycle oil, thus avoiding the enlargements of a refinery otherwise necessary to take care of finishing up of products of the cracking plant. The standard unit will give ultimate yields from any grade charging stock.

Three of the standard units have been contracted by Skelly Oil Co., at El Dorado, Kans., to augment the three smaller units now in operation and one unit has been contracted by Shreveport Oil & Gas Co., at Shreveport, La.



Three-unit installation of the Jenkins process at the El Dorado, Kans., refinery of the Skelly Oil Co.

The Jenkins process operates with comparatively low temperature and pressure. For ordinary runs producing 370 degree end point gasoline a temperature of 750 degrees Fahrenheit and a pressure of 110 pounds is carried. Both can be varied, however, to produce any desired product.

The Jenkins process also employs mechanical means to force the oil through the heating area consisting of a bank of comparatively short straight tubes.

Another feature of the Jenkins process is that no coke forms in any part of the equipment. The small amount of amorphus carbon which does form is, to a great extent, held in colloidial mixture with the oil and is continually removed as such during the process. The small amount of carbon not mixed with the oil deposits in a soft mass in the still drum proper.

Explanation of Process

The still proper is composed of the longitudinal drum A which is connected with the transverse or header drums B and C by sluiceways D and E, D being slightly larger in diameter than E. The header drums are connected by the bank of tubes F. This bank of tubes is the only part of the still to which heat is applied. It is baffled off from the transverse drums by baffles and from the longitudinal drum by a suspension arch. No flame is permitted to impinge upon the tubes. The oil absorbs the heat so efficiently that the flue gases have a minimum temperature when reaching the smoke flue. Pyrometer readings are taken in the passes through the bank of tubes to permit the operator to regulate his fires to suit the requirements.

It is unnecessary to tear down any part of the unit when tubes are renewed.

This still is charged through line J until the gauge shows the charge completed. Valve I is then closed. When this point is reached the burners are lighted and circulator N is started which sets the entire still charge in circulation, constantly driving it through the tubes F. When the temperature of the still reaches 500 degrees Fahrenheit, valve P is closed and pressure built up in the system.

Ordinarily at 75 pounds pressure, valve P is partially opened and the temperature and pressure regulated to the desired relationship. The vapors are held above the oil in drum A, the vapor line Q and the tower R. The temperature of the tower R is held at a point necessary to reflux through line S products not thoroughly cracked and release only vapors of the desired density. After passing through valve P the vapors enter the bubble tower where there is a further condensation of recycle stock and gasoline of 437 degrees end point passes to the condenser. By installing an additional bubble tower at this point the gasoline is fractionated to 375 degrees end point and 450 degrees end point.

Feed System

As the vapors leave the tower the level of the oil in the still lowers. A continuous feed of fresh charging stock and recycle oil from the bubble tower is fed into the system through line U. It enters the tower R at the top and in its course through the tower assists in refluxing the vapors and is preheated by them. The feed of raw oil enters the still together with the reflux through line S.

As the cracking proceeds, a certain relatively small amount of carbon is formed, which is continuously removed from the still in order to prevent any excessive accumulation. Due to a special treatment, this free carbon is mostly held in suspension in a colloidial form, and is soft and friable rather than hard and flinty, at no time adhering to the tubes and shell of the still or forming coke.

The free carbon thus specially treated is, together with uncracked residue, removed from the system and discharged into an expander or vaporizer A where the pressure is released. Due to the excess of heat remaining in the oil at this lower pressure a portion immediately "flashes" into vapor. This vapor is collected by a vapor line C, passes through a condenser and is returned to the system with the recycle stock from the bubble tower.

The residue in the expander flows to the settler M where the carbon held in suspension settles out and is drawn off. The balance of this residue containing the colloidial carbon is 10-degree Baume fuel oil. It flows from the settler through a cooler into storage.

When the operation becomes regulated and all pumps and valves set, the still requires practically no attention while running as long as the raw material feed remains unchanged. At the end of the run, when the still has cooled sufficiently, the oil in the still is pumped out through line J.

Mechanical Circulation of Oil

The outstanding mechanical distinction of the Jenkins process is the method of transferring the heat from the furnace into the body of oil under treatment. As shown above, the body of oil under treatment is passed through the furnace by means of a multiplicity of relatively short tubes, connected in parallel by means of header drums.

Heat transfer is accomplished by repeated rapid passage of the oil through the tubes, thereby transferring the heat from the furnace into the oil in many small increments, with a relatively small amount of cracking at each passage. The oil flows through the tubes with a velocity of about 12.2 feet per second, which allows but 1.7 to 1.8 seconds for the entire passage.

The circulation and continuous feeding of raw oil are entirely independent of each other, each being accomplished by separate means. They are also independent from the return of refluxed oil into the still. The propeller is used for circulation only, the continuous feed pump for feeding only, and the refluxed oil is returned by gravity. The rate of either may be varied without interference whatever with other operations.

Cycle of Operations

A typical cycle of operation is on stream 15 days or 360 hours; cooling, cleaning and heating 24 to 26 hours. This gives an operating factor of 93 per cent.

A test run was made at the Skelly Oil Co., El Dorado, Kans., by keeping the process on stream for 44 days. During this time 32,000 bbls. of gas oil were cracked. On cleaning only 2,000 pounds of carbon were found, all of which was easily removed. This deposit was almost entirely in the still drum, the tubes being practically as clean as at the start of the run. The still was back on stream in 26 hours.

The manufacturers state that the reason for this high operating efficiency and short shutdowns for cleaning is that the continuous removal of carbon keeps the vital parts of the unit—the tubes—free of deposits of coke which hinder efficient heating and make cleaning difficult.

Results and Product

As explained under the diagrammatic sketch, the cracking is under complete control, changeable at any time during the operation. Market conditions alone determine the product.

A daily average of results made over a long period of time shows the following:

Throughput 1,000 bbls., consisting of

	Bbls.
Virgin gas oil	466
Recycle stock	534
Output	
Gasoline, 437 degree end point (60 per cent of virgin stock)	280
Fuel oil, 10-degree Baume	150
Recycle oil	534
Loss	6
Gas loss (used in heating and equivalent to	20

This gas loss will, together with 7 barrels of fuel oil, furnish sufficient fuel for the daily operation.

The gasoline comes out 28 color, contains no gum forming material and requires only the usual doctor treatment without any rerunning or acid treatment. The gasoline will withstand stability and corrosion tests.

The total cost of the standard unit will never exceed $300 per barrel of gasoline produced per day. The cost includes bubble towers, all necessary piping and erection. The total cost of making one barrel of gasoline, including interest, royalties, depreciation of oil account, will average $1.20.

The patents for the Jenkins process are held by the Jenkins Petroleum Co., 208 South La Salle Street, Chicago, and the manufacturing and sales rights by Graver Corp., East Chicago, Ind.

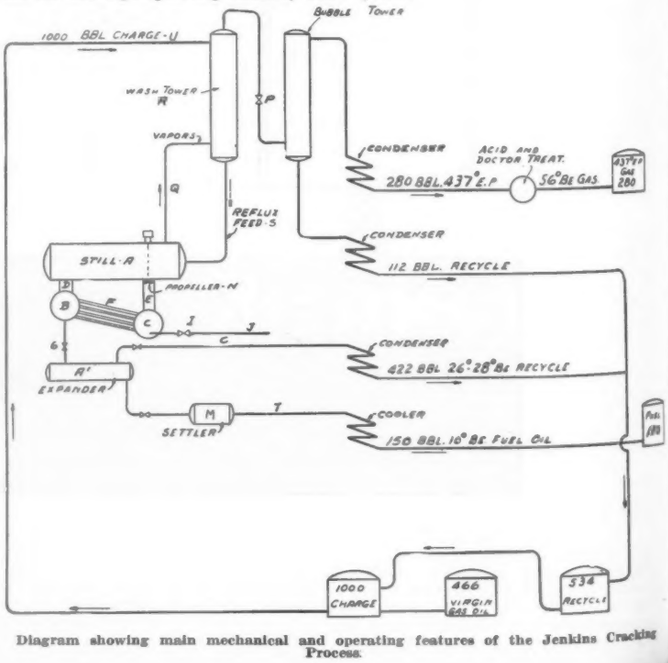


Diagram showing main mechanical and operating features of the Jenkins Cracking Process.

OIL SITUATION SOUND

NEW YORK, Feb. 21.—Frank D. Gibson, president of the Gibson Oil Co., says: "The petroleum situation is sound, in fact the oil business is on a sounder basis than at any time since it became one of the major industries. Supply and demand indicate an upward trend of prices."

JENKINS CRACKING PROCESS

Standard Unit

Produces Quality Gasoline

Export specification without rerunning

Unusual Low Cost

No loss in product or time from coke formation

Flexibility of Unit

Market condition alone determines product

Manufactured and Sold only by

GRAVER Corporation Founded 1857

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Steel Tanks and General Steel Plate Construction

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Refiner's Interest in Research Work

Practical Progress Measured by Profitable Results to Industry and Public. Need for Further Experimental Effort

By Benjamin T. Brooks

"Manufacturing is becoming more and more a system of scientific processes."—A. W. MELLON.

The manifold application of scientific research is the one thing, above all others, which distinguishes modern industry from the industrial arts of earlier times. Everyone is more or less familiar with the great mass of testimony which bears witness to the fact and only a moment's reflection is sufficient to recall to mind that different industries have been affected to widely differing degrees. Some have been thoroughly transformed, and indeed two of our great industries, the electrical and coal tar chemical industries, have been brought into being directly by research. The full weight of this fact is appreciated only when we stop to consider what research is.

What Is "Research?"

It is worth while to discuss this a little since most of us are apt to consider that research is something abstract and quite detached from our every day work, a little mysterious and not easily defined, and even many who are actually engaged in the work of investigation often have a very narrow conception of it. We are bothered too much by definition and names. Thus one might easily suppose that engineering is far removed from research, although the essential facts used in our everyday engineering calculations, such as the values of thermodynamics and thermochemistry, the properties of fuels, iron and steel and other materials of construction, have been obtained by somebody's painstaking investigations. The petroleum industry even now needs better physical constants of petroleum and petroleum products for the design of refinery equipment. Furthermore, engineering undertakings are sometimes experimental, though perhaps on a great scale; a man who builds an improved cracking still or tries out some special equipment for conserving heat is carrying out research just as truly as one who does similar work on a small scale in an experimental laboratory. The principal difference is that mistakes on the large scale cost more money.

After all, what we are after is new, useful and accurate information, and while it is not worth while to be fussy about definitions, it is decidedly worth while to bring the constructive engineer, operator and scientific investigator closer together in more effective cooperation. In the petroleum industry they have often been miles apart.

Research in Other Industries

The maintenance of well equipped research laboratories by manufacturing concerns has been a comparatively recent development and the earliest conspicuous examples were the large chemical establishments in Germany. They also learned the trick of retaining exceptionally able university investigators at an early date. In this country the privately maintained research laboratories have grown from small beginnings and not one was started on anything like their present scale. They have been enlarged as they have been found to pay. The following is a recently compiled list of several well known American manufacturing concerns and the amount of money spent by them for salaries alone in their investigations:

Company—	Research Staff Technical	Research Staff Non-Technical	Salaries
Barrett Co.	45	20	$ 206,500
E. I. du Pont de Nemours Co.	200	322	1,304,000
Eastman Kodak Co..	105	...	346,000
General Chemical Co.	46	...	151,000
*General Electric Co.	128	...	422,000
Gen. Motors Research	253	...	834,000
Goodyear Tire & Rubber Co.	192	163	963,000
National Lead Co....	34	...	112,000
New Jersey Zinc Co..	34	...	112,000
Solvay Process and Sement Solvay.....	53	5	184,000
Underwriters Laboratory	51	.. .	168,000
Union Carbide & Carbon Co.	70	...	231,000
U. S. Industrial Alcohol Co.	27	...	90,000
Western Electric and American Telephone & Telegraph Co....	more than		4,000,000
Westinghouse Electric & Mfg. Co.	38	...	171,000

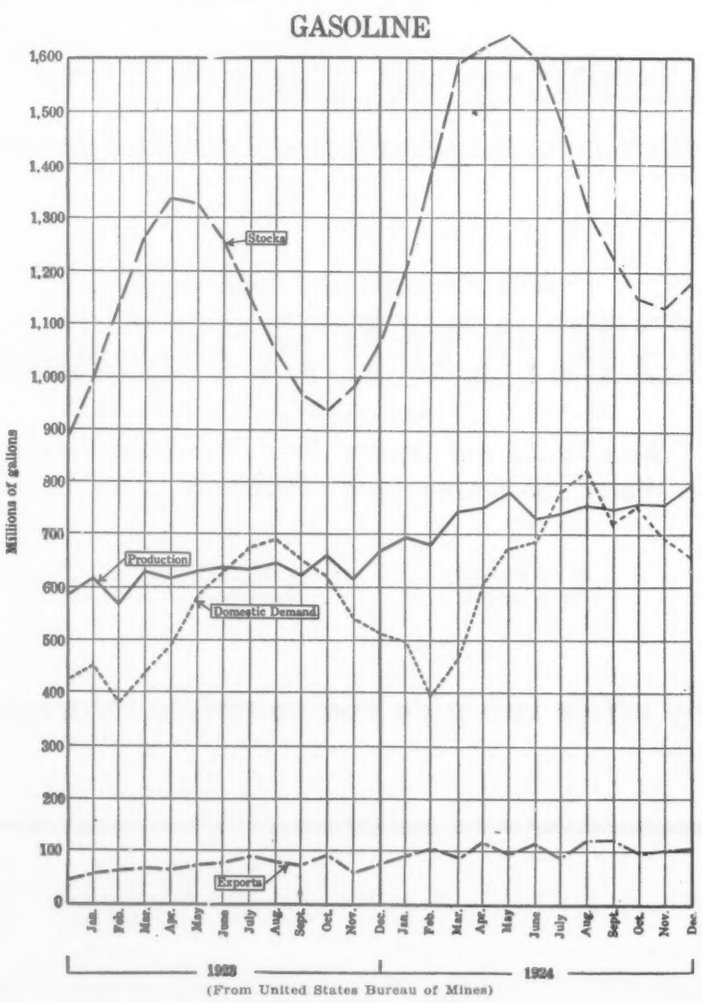
*Note—Does not include machinists, glass blowers, electricians and clerks, employed in the research laboratories and who are paid more than $1,000,000 annually.

Figures for the petroleum industry are not available, though if they were, and did not include salaries paid for routine testing and plant control, it is certain the figures would be relatively very small, particularly when we consider that the petroleum business is the second largest American industry and is reported to represent a total investment of about $9,000,000,000. However, these figures do not stand as a reproach of our petroleum interests if it be true that owing to some special conditions peculiar to the petroleum industry research is not needed. That is precisely the question which it is worth while to discuss.

Research in Petroleum Industry

It is true that compared with the electrical, coal tar chemical, automobile, ferrous and non-ferrous metallurgy and the general chemical industries, that of petroleum has benefited but very little from research. Even so it may be pointed out it has profited very largely from what relatively little has been done. Without going into detail it may be recalled that Frasch's work on the desulphurizing of the Lima-Indiana oil made its utilization possible, and in fact one of Mr. Rockefeller's important early strokes was buying up that oil at the prevailing initial low figures nad refining it by the Frasch method. The air oxidation of residuums to ashpalt credited to Byerley and Mabery has converted many hundreds of thousands of tons of residuum into petroleum asphalt. Many special products, requiring more or less investigation, have been manufactured, special problems of refining solved, and in recent years the art of cracking for gasoline has been developed, and though this has been done almost entirely by large scale experimentation rather than by small laboratory experiment, it is nevertheless a great achievement properly credited to investigation, or, as some might prefer, engineering experimentation.

The above examples are sufficient to indicate that the petroleum industry has profited by research, but there is no apparent reason why it cannot profit to a much greater extent by more investigation.



(From United States Bureau of Mines)

Petroleum is still used and regarded chiefly as a fuel, as the following figures for the consumption of the major petroleum products in 1923 show:

Domestic Consumption in 1923

	Gallons
Gas and fuel oils	12,000,000,000
Gasoline	7,500,000,000
Kerosene	2,300,000,000
Lubricating oils	1,100,000,000

Industrial Changes

Petroleum asphalt manufactured from residuums may also be considered to be a major product, amounting to several hundred thousand tons annually. In addition to this there are quite a number of relatively minor products, minor from the standpoint of bulk production, but important in that they sell at considerably higher price levels, for example, paraffin wax, vaseline, compounded greases, pharmaceutical white oils, etc. It should not be thought that those interested in research as applied to petroleum contemplate transforming the industry into something else. Lubricants and motor fuel are absolutely indispensable to modern industry, and it is inconceivable any chemical derivatives could be manufactured and sold which would be more than a relatively small fraction of our motor fuel requirement. Although it should be possible to develop processes for the manufacture of a number of materials, not now made from petroleum, and in fair tonnage quantities, these major products might be considered first. One of the conspicuous industrial changes of very recent years has been the increased production and favor of artificial gas, particularly for heating, and in this connection it is worth while to note that in this country the artificial gas industry represents an investment of about $4,000,000,000. Ten per cent of all the oil used for gas making to date was consumed in 1923. In cracking oil for gas a series of rather simple hydrocarbons are produced whose chemistry is fairly well known and which can be converted into a variety of other products of established, commercial value. Apparently we are on the threshhold of some very interesting commercial developments along this line. If, through diversified products of manufacture, gas oil attains a higher relative value, or continues to increase in demand, this must in turn react upon gasoline, since we have looked upon gas and fuel oil as the great reserve supply of material to be drawn upon still further for cracking for the production of gasoline, as indicated by the above figures for 1923.

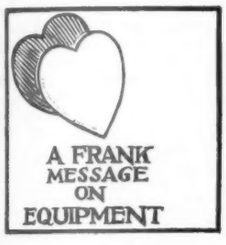
Lubricating oils, another of the above noted major products, can certainly be improved both as to process of manufacture and product. Space forbids discussion of the details of this and other similar questions, but we do not now know, but certainly will know why certain oils are better in actual performance than others. The reason is a chemical one. A great deal of mystery has been thrown about this matter of lubricating oils, and it is curious that certain of our American oils are still heralded as paraffin oils and therefore better than various other oils, whereas there is good evidence that these so-called paraffin lubricating oils, after the customary chilling and removal of wax, contain no paraffins whatever. An old hoax or misapprehension is difficult to Scotch.

Getting More Gasoline

Again, referring to one of the major products, gasoline, it may be noted that only very recently efficient rectifying columns, generally of the "bubble tower" type, have been extensively installed. A single ompany has installed more than two hundred such columns within the last three years. Increases in gasoline

(Continued on Page 227)

IS TANK PROTECTION *a matter of course, or of* IMPORTANCE *to YOU?*



Most operators realize that the enormous oil waste that saps production is largely due to evaporation. But when it comes to buying tank equipment for protection and conservation, they only half complete the purchase—because they buy equipment that has not been perfected to definitely meet these needs.

Tank safety and conservation equipment, to even merit the name, should reduce evaporation losses safely; should prevent tank collapse and rupture; should reduce insurance premiums and should have the approval of *insurance companies. But even equipment that does all this can very well prove costly through maintenance and failure in emergencies.*

WESTCOTT & GREIS safety and conservation equipment has the only basically correct design on the market—THE LIQUID SEAT. There are no seats to corrode or require grinding, thereby eliminating maintenance costs; there is nothing to adjust. No vapors can escape through the LIQUID SEAT. This means that liquid safety and conservation devices are the *sure* method of combating evaporation and fire hazards, and at the same time offering a high safety factor through the operation of the LIQUID SAFETY VALVE.

THE LIQUID SAFETY VALVE operates by means of two cylinders seated in mercury—one cylinder to relieve excessive vacuum and another cylinder to relieve internal pressure. These cylinders cannot stick, due to the fact that they have a half-inch clearance between guide and interior stack, which gives them smooth, instantaneous action. *But* they are properly guided at all times. One-half ounce pressure or vacuum, per square inch, is sufficient to operate the cylinders.

For positive PROTECTION and the CONSERVATION of vapors and gases, LIQUID SAFETY VALVES have demonstrated their superiority of design and construction, and by actual working efficiency.

If you would know for yourself the vast difference LIQUID SAFETY VALVES make in conserving stored oil in tanks on which they are installed, gauge your tank for a month or two when other equipment is used; then install a LIQUID SAFETY VALVE. The result will surprise you. See your insurance man, too. He'll advise you concerning this equipment, which is installed under standard insurance specification; when installed under these standards the lowest rate of insurance prevails.

Bill O'Meilig

Sales Engineer for

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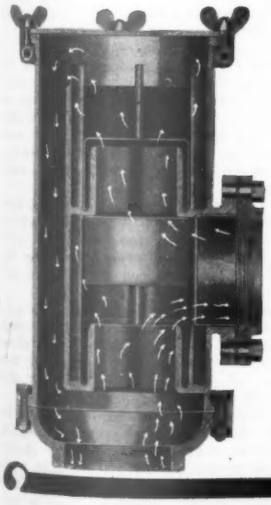

111

Suppose your Tanks were filled with Gold—

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CONSERVATION AND SAFETY

Cracking Capacity Compared by Area

Daily Throughput in Past Year Shows Remarkable Parallel With Capacity of Refineries Having Cracking Processes

By Charles E. Bowles

The census of refineries issued by the United States Bureau of Mines as of November 1, 1924, contains the following paragraph:

"No data on cracking are included, although our questionnaire called for such, for the reason that the information obtained was incomplete. Perhaps at a late date an effort may be made to obtain and publish cracking data."

The pamphlet issued by The Oil and Gas Journal listing the refineries of the United States as of May 1, 1924, indicates those refineries which up to that time had been equipped with cracking plants—and the accompanying tables have been compiled from that list.

The Standard of Indiana, which for years pioneered "cracking" through research and the practical development of the Burton process has probably accumulated more definite statistics on this phase of the production of motor fuel than any other single agency. Up to the present time the collection of data on cracking has been confined almost entirely to the larger manufacturers of plants, to a few of the largest refining companies and to compilations from questionnaires such as was published by The Oil and Gas Journal.

In referring to the accompanying tables it should be borne clearly in mind that there is no fixed installation ratio and no fixed operating ratio between the "rated capacities" of refineries and the cracking plants with which they are equipped.

Up to the present only the Standard companies and a few of the larger independents whose markets are definitely determinable, have "balanced" their installations of cracking stills with their fractionating stills. And the low prices of motor fuel that have ruled for several years have had more influence on cracking plant operations than the actual efficiency of the plants themselves.

Cracking and Blending

The refining industry has definitely passed the stage when the old type fractionating still was the dominant factor in the production of motor fuel. Today the oil industry and the motor fuel using public are almost tragically dependent on the cracking plant, the natural gasoline plant and the blending plant. Without them, there would be chaos in the oil industry and the motor vehicle industry simply because, with the present development of the group of industries built around the internal combustion engine it would be a physical impossibility for the oil producers to supply enough crude oil to enable the refiners to make enough motor fuel to supply present demands if we had no cracking plants and natural gasoline plants and were dependent wholly on the old type "fractionating" still.

The change has come so quietly that only the refining end of the oil industry has realized the full significance of this new phase of development which, in the last analysis, is today very probably "conserving" more crude oil than has ever been wasted through poor well and lease operation.

The average production of crude oil in the United States during the year 1924 was 1,969,211 bbls. per day. Imports from Mexico averaged 212,500 bbls. a day, hence the total available supply of oil averaged 2,181,711 bbls. a day.

Of this amount 1,871,000 bbls. a day were run to stills and the remainder, 310,710 bbls. a day, was either exported, used for fuel and other purposes, or added to storage.

From this throughput which averaged 1,871,000 bbls. a day during the year 1924, there was "recovered" an average of 583,000 bbls. a day of gasoline—or an average recovery of 31.2 per cent.

In 1923 the average recovery was 30.4 per cent—and in 1922 it was 28.4 per cent.

In 1924 we ran slightly less than 685,000,000 bbls. to stills and made almost 213,000,000 bbls. of gasoline. If the refineries in 1924 had been operating on the same basis as in 1922 they would have had to run 750,000,000 bbls. to stills to make the 213,000,000 bbls. of gasoline that we actually made in 1924.

In other words, 24 months' progress in the industry actually "conserved" 65,000,000 bbls. of oil. This 65,000,000 bbls. which, because of the progress in the industry we were not called upon to use, would have been worth at $1.50 a barrel, practically $100,000,000.

Or to put it another way—28.4 per cent recovery from 750,000,000 bbls. of crude oil yields 213,000,000 bbls. of gasoline, while 31.2 per cent recovery from 685,000,000 bbls. of crude yields 213,000,000 bbls. of gasoline. We operated on a 28.4 per cent basis in 1922 and on a 31.2 per cent basis in 1924—and thereby saved 65,000,000 bbls. of crude oil.

Stupendous as is this saving, due to only two years of progress in the industry, it is only a fraction of what we are saving today as compared with the basis on which the industry was operating in 1914 when we were getting only 12.5 per cent gasoline from the crude. On the 1914 basis, we would have had to run 1,700,000,000 bbls. to stills to have got the same amount of gasoline that in 1924 we got out of 685,000,000 bbls.

Swift Progress

In few other industries has the "march of progress" been as swift as in the refining industry—and few other industries can furnish concrete proof that in their manufacturing departments they are today using only 40 per cent as much "raw material" to produce a given result as they were using only 10 years ago.

It is idle to think that on a 12½ per cent recovery basis the motor vehicle industry would have developed to anything like its present proportions—or that the oil industry would have developed along anything like its present lines.

Referring to Table 1, it is interesting to note that the area east of the Mississippi River, which in 1924 produced less than 6 per cent of the oil of the United States, ran 619,000 bbls. to stills or almost 33 per cent of the total throughput.

Of the total output of gasoline in the United States in 1924 (583,000 bbls. a day) the refineries east of the Mississippi made 208,300 bbls. As they ran an average of 619,000 bbls. a day to stills the "recovery" was 33.6 per cent.

TABLE 1—Crude oil production for 1924, with refining capacity and cracking plant installation as of May 1, 1924. All operations are reduced to a daily basis.

Item—	California	Rocky Mountain	Mid-Cont.-Gulf Coast	East of Miss. River	Total
Crude oil	628,588	116,149	1,120,342	104,132	1,969,211
Refining capacity	763,900	107,950	1,311,980	860,960	3,044,790
Capacity of refineries with cracking plants	428,000	83,000	715,200	608,950	1,835,150
Run to stills	427,000	95,000	730,000	619,000	1,871,000
Gasoline (barrels)	86,800	42,300	245,600	208,300	583,000
Per cent	20.3	44.5	33.6	33.6	31.2

The daily output of the Mid-Continent-Gulf Coast area averaged 33.6 per cent—the Rocky Mountain area 44.5 per cent, and California 20.3 per cent.

Accepting the aggregate refining capacity of the United States at approximately 3,000,000 bbls. it is obvious that, in 1924, with an average daily throughput of 1,871,000 bbls., the refineries operated at about 62 per cent of their "rated" capacity.

There is a remarkable parallel in table 1, between the average daily runs to stills in the four areas and the capacity of the refineries equipped with cracking units.

East of the Mississippi the daily average runs to stills were 619,000 bbls., while refineries with cracking plants aggregated 608,950 bbls. capacity. In the Mid-Continent-Gulf Coast area 730,000 bbls. daily were run to stills while the refineries with cracking plants aggregated 715,200 bbls. a day capacity. In the Rocky Mountain area the daily runs were 95,000 bbls. while the "cracking equipped" refineries aggregated 83,000 bbls. capacity. In California 427,000 bbls. were run to stills while cracking equipped refineries had an aggregate capacity of 428,000 bbls.

In other words, while the refineries of the United States were putting through 1,871,000 bbls. a day, those refineries with cracking equipment had an aggregate refining capacity of 1,835,000 bbls. a day.

This amazing parallel can mean but one thing—that, in the aggregate, the great bulk of the refineries that are "putting through the oil" are equipped with cracking plants.

As previously stated, it should be clearly understood that it does not follow that the aggregate capacity of the cracking plants is 1,835,000 bbls. a day—the only fact is that the refineries with cracking plants had, on May 1, 1924, an aggregate refining capacity of 1,835,000 bbls. a day.

Undoubtedly the most dependable estimate of the gasoline producing efficiency of the cracking plants of the United States was published in a recent issue of "The Lamp" (Standard of New Jersey). It contained the following estimate of the total production of gasoline in 1923 from all sources.

	Barrels
Straight run distillation	132,000,000
From cracking plants	40,000,000
From natural gasoline plants	22,000,000
Total	194,000,000

On this basis the cracking plants, in 1923, produced 20.6 per cent of the total output of gasoline.

On January 1, 1923, the stock of gasoline on hand was 21,000,000 bbls. and on December 31 it was 25,500,000 bbls., an increase of 4,500,000 bbls. during the year. In other words, we used up all of the gasoline that we made except 4,500,000 bbls. (which we added to stock) and it obviously follows that if we had not made 40,000,000 bbls. of cracked gasoline in 1923, we would have been 34,500,000 bbls. short of being able to take care of our domestic and foreign requirements.

Cracking and Natural Gasoline

In 1923 the old "straight run" distillation process furnished only 68 per cent of all the gasoline made that year, the cracking plants furnishing 20.6 per cent and the natural gasoline plants 11.4 per cent.

Outside of the refining industry probably few people in the United States realize that the cracking plant and the natural gasoline plant are the two outstanding things that have saved them from tremendously high prices for gasoline.

The modern cracking plant started with the Standard of Indiana-Burton process patented in 1913—and as for years they were almost the only pioneers in this new field it is only natural that the Standard Companies should, in the aggregate, be the dominant factors in cracking. How this has worked out is clearly shown in Table 2.

Table 2—Standard cracking processes and other types, by areas:

Areas—	Standard Processes	Other Processes
East of Mississippi		
1—Atlantic Seaboard, with New York, Penn., West Va. and eastern and central Ohio	205,500	211,150
2—Lima, Indiana, Illinois and Kentucky	102,000	90,300
Mid-Continent-Gulf Coast—		
1—Kansas - Missouri	38,000	77,300
2—Oklahoma	5,000	113,500
3—Texas	71,800	240,500
4—Arkansas	12,000	9,000
5—Louisiana	84,600	63,500
Rocky Mountain Area—	65,500	17,500
California	200,000	228,000
Total	**784,400**	**1,050,750**

Bearing in mind that in the aggregate for the United States there is no fixed ratio between the capacity of refineries and the capacity of the cracking plants with which they are equipped, it is, nevertheless, interesting to note the relation between Standard processes (nearly all Burton) and the aggregate of all other processes.

Processes in Use

East of the Mississippi River, in the Atlantic Seaboard and adjacent areas, 205,500 bbls. of Standard refining capacity are equipped with Standard cracking units (largely Burton) compared with 211,150 bbls. of Independent refining capacity equipped with all other types.

In the Lima-Indiana, Illinois and Kentucky area 102,000 bbls. of Standard refining capacity are equipped with Standard cracking processes while 90,300 bbls. are equipped with "other processes."

East of the Mississippi, out of a total "rated" refining capacity of about 800,000 bbls. a day, over 608,000 bbls. of capacity are equipped with cracking processes—of which 307,500 bbls., or just over 50 per cent are Standard.

It does not follow, however, that because the capacity of the so-called independent refineries east of the Mississippi is approximately 300,000 bbls. while Standard refineries are 307,000 bbls., that the independent refineries run a proportionate amount of crude to their fractionating stills.

Neither does it follow that the cracking plants connected with this 301,000 barrels of independent refining capacity "crack" about the same amount of oils as the plants connected with the 307,000 bbls. of Standard refining capacity.

In the Mid-Continent-Gulf Coast area the Kansas-Missouri refining territory

(Contiued on Page 148)

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Some Economic Aspects of Cracking

Constantly Changing Market Conditions in Oil Industry Demand Flexible Processes Which Will Handle All Kinds of Charging Stocks

By Gustav Egloff
Research Laboratories, Universal Oil Products Co., Chicago

The oil industry is without doubt the most unstable in the world in regard to market conditions for its products. From the inception of the industry, in the year 1859, the wildest fluctuations in the market value of crude oil and its products have been going on down to the present day. Economic changes involved in market prices for the products derived from crude oil have wrecked many a good refiner and his company. The past three years have been one of the most difficult periods through which the oil business has passed. A staggering overproduction of crude oil and refined products has prevailed during this period and only at the present time are there any signs of a turn in the road for the better in the oil industry.

During these difficult years competition has been keen but the struggle in the future for refiners must of necessity be greater than in the past, for the oil industry has awakened to the fact that its wasteful methods must be supplanted by more ecenomic means or their management will be replaced by Governmental meddling or supervision. A refiner, to survive in this age, must use the most efficient method of converting his oils into maximum yields of gasoline and other products. He should bear in mind constantly the historical facts of the industry. The axiomatic law of supply and demand in the period cycles of low and fair prices for his products, must be heeded. A gratifying position for the refiner to be in, is to produce the maximum yield of highest priced and best moving products of his refinery. To be strategically situated with his equipment so as to take advantage of fluctuating market demands, gives him a feeling of safety.

Gasoline Carries the Burden

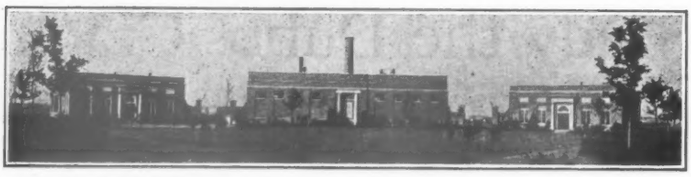
Gasoline is the refiner's general panacea for profit making. Gasoline carries the burden of the refiner's load. Without substantial yields of gasoline from the crude oil, the refiner operates at a loss. He should be in such a flexible position that he can convert into gasoline the low market valued fractions of his crude oil or low grade crude itself by cracking.

In this industrial age no refiner can look forward to continuing profits unless he is provided with a flexible cracking process which will convert at any time any type oil into more than 50 per cent gasoline, without changing a single bolt.

It is historical fact that many plants have been installed throughout the United States for the cracking of kerosene into gasoline when the price of kerosene was approximately 1 cent a gallon. The story runs that some years ago kerosene was given away so as to make storage room for the other products. These cracking plants were strictly limited to kerosene charging stock, due to its low coke formation under heat and pressure conditions. As soon the price of kerosene advanced these plants were shut down and abandoned, with loss of millions of dollars to the petroleum industry.

Need Flexible Plants

It is now a fact that cracking plants have been installed which are limited solely to gas oil charging stock. These cracking plants have at times been shut down due to the fact that it was uneconomic to operate at the prevailing prices of gas oil. Plants which are solely dependent upon gas oil charging stock have had their day and must give way to a more flexible and profitable means of procedure. The method should take the lowest priced oil in the refinery and convert it into large percentage yields of gasoline commercially. The lowest priced oil may be either kerosene, gas oil, fuel oil, slop oil, or heavy crude. The process



Research laboratories of the Universal Oil Products Co., located at Chicago, Ill.

should handle all type of oils with equal facility, without making any constructional changes whatsoever, merely the shifting from one storage tank to another.

It is well known to the refiner that he is always up against a shifting market as to the value of his products and he knows that, as recently as January of this year, acid treated, steam distilled, water white 41-43 gravity kerosene has sold for less money than 38-40 gravity straw distillate. Likewise straw distillate has been below, or at the same price as dark gas oil.

The ever advancing demand for straw distillate or gas oil for domestic use in homes, office buildings, hotels, apartment houses, and Diesel engines will reach a magnitude that in a few years, more than half the total straw distillate and gas oil will be required for other uses than cracking stock. Gas oil for Diesel engine use is growing in veritable leaps and bounds and it is stated that in Europe a modification of the Diesel engine is now operated commercially for truck use with a 38 gravity distillate; therefore, it behooves the refiner to investigate cracking methods so that he will not be saddled with an installation that is limited to kerosene, straw distillate, or gas oil for charging stock.

Must Meet Changing Conditions

This means that one can predict with accuracy that should he install a method limited to these types of charging stocks, he will be shut down at some part of the year due to the fact that it is uneconomic to crack said stocks. He should investigate thoroughly the various installations first-hand and judge as to the flexibility of the methods in converting any type charging stock which the refiner may have, into high yields of gasoline with a maximum throughput of the charging oil. He should, in view of his best knowledge, install a process which is so flexible that it will meet any refining condition as wells as any shifting market condition so as to always crack his lowest valued oil into gasoline. In view of the continual discovery of low grade crude oil fields having a low gasoline content, a refiner must take into account the fact that he may be required to process this oil in addition to the relatively high grade crudes. In the event that this takes place, he should be provided with a cracking process which will simultaneously skim and convert a heavy crude into high yields of gasoline.

There are many type crudes produced in Texas, Louisiana, Oklahoma, Kansas and other States which have a low gasoline content. In the cracking process the refiner should take this condition into account when passing upon the merits of the methods in commercial use for cracking oil and focus, at least in part, his attention to the flexibility of a process which can take any type of oil and convert it into high yields of gasoline; for he understands that market prices of fuel oil may be well above the prices of crude.

Coking Oils Is Costly

Hence, it becomes a material advantage to him to have a process which will take a crude oil as it comes from the well and convert it by heat and pressure into more than 50 per cent gasoline with one passage of the oil through the process; and this without the necessity of first coking the crude oil so as to obtain a distillate suitable for cracking stock in an installation which is limited solely to distillate from the crude petroleum. The cost of coking heavy crude oil is of that magnitude that it becomes uneconomic when compared to a method which will produce over 50 per cent gasoline without the necessity of preliminary coking the crude.

Fuel oil is the most prolific source for gasoline production by means of cracking. Fuel oil is normally the lowest priced commodity with which the refiner has to deal. The margin of profits for conversion of fuel oil, of any gravity whatsoever, into gasoline, is greater than of any other potential charging stock. The conversion of fuel oil into yields of over 50 per cent gasoline is common practice in many refineries. The fuel oil, say in the Mid-Continent Field, of from 18 to 26 Baume, is being commercially cracked without the need of first producing a distillate for cracking stock by coking, or running to a heavy flux. The fuel oil is charged directly to the pressure stills, without any preliminary treatment such as coking, to make it available for cracking stock. It is suggested that a refiner investigate thoroughly commercial cracking of heavy fuel oils and ascertain for himself the throughput and yields being obtained. It is desirable for him to know the flexibility, simplicity and ease of operation in the cracking not alone heavy oils but any distillate from the crude, or crude oil itself. In the same process kerosene, gas oil, fuel oil, or heavy crude have been alternately cracked into 50 per cent or more gasoline, as a function of shifting market value of potential cracking stocks.

Need Obtain Two Products

Another factor of import to the refiner is first-hand knowlege of this fact that just two products need be obtained from a commercial cracking process, and they are gasoline and coke; and this is going on commercially, without the necessity of coking stills, for the preparation of the charging stock. The yield of gasoline with one throughput of the charging oil is over 60 per cent by this method of operation.

It is a commercial fact that cracking has reached such an advanced stage of development that the same process, without the change of a valve or a bolt, will convert kerosene charging stock, straw distillate charging stock, gas oil charging stock, fuel oil and heavy crude oil charging stock into yields of over 50 per cent Navy specification gasoline, and these charging stocks may be derived from Mid-Continent crude oil of every description, Coastal, Wyoming, California, Mexico, Venezuela, Borneo, Rumania, etc., and these results can be accomplished without any preliminary treatment of the charging stock, such as redistillation or coking or treatment in any manner whatsoever.

As years roll by it becomes increasingly difficult to find new oil fields in the United States to satisfy the maw of the automotive industry. During 1924 approximately 17,730,000 automotive cars were registered in the United States and the domestic consumption of gasoline during the year was 7,800,000,000 gallons. This literally amazing consumption of gasoline, it is predicted, will be 10,000,000,000 gallons by the year 1928. The pertinent question is, where is this quantity of gasoline coming from? Can we rely on bonanza oil fields being discovered in the magnitude of the Santa Fe Springs, Long Beach, Huntington Beach, Powell, and the fast diminishing Wortham Field?

Great Gasoline Demand

The geologist has been ever insistent upon the conservation of oil reserves and has predicted a real shortage in a relatively short time. The crude oil production of 1924 was approximately 18,000,000 bbls. less than in 1923. During the year 1923, 738,877,176 bbls. of crude oil were produced in the United States and during the year 1924, 720,731,122 bbls. were produced, and it has been estimated in The Oil and Gas Journal that the production during 1925 will be approximately 700,000,000 bbls. In view of the decrease in crude oil production in the

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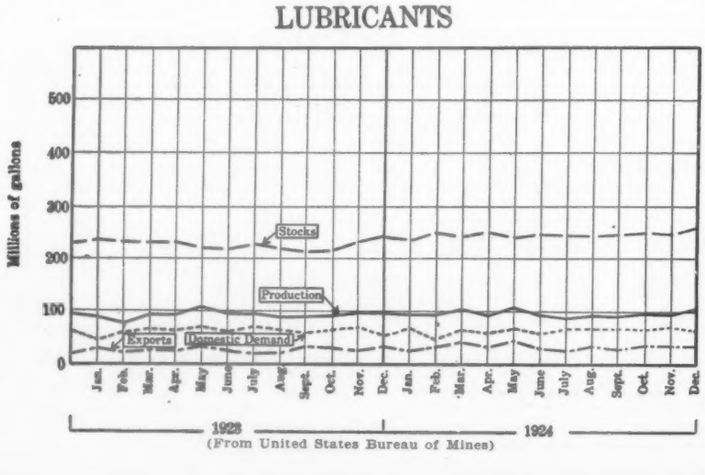

(From United States Bureau of Mines)

Cross Cracking Process Described

Operating and Maintenance Costs Low With Large Recovery of Gasoline of Best Quality. Description of Recent Installation Given

By Guy N. Harcourt
The M. W. Kellogg Co.

Since the commercial development of cracking processes beginning with the Burton process, the place of the cracking plant in the refinery has undergone a decided change. In the comparatively recent past the development of a cracking process which could be patented by the inventor and from which he expected to derive enormous sums as royalty payments, was the expressed or unexpressed desire of many persons connected with the refining industry. The refinery world was startled daily by announcement that a new process had been developed which would give unheard of yields, would crack material that could be utilized by no other process, or which would stay on stream for an indefinite period. Due to the demand for gasoline and the very great differential between the prices of gasoline and the heavier oils, large profits could be made even with the crude equipment then in use. Out of all this there have been developed a comparatively few commercially accepted processes which today make up nearly all the cracking capacity in use.

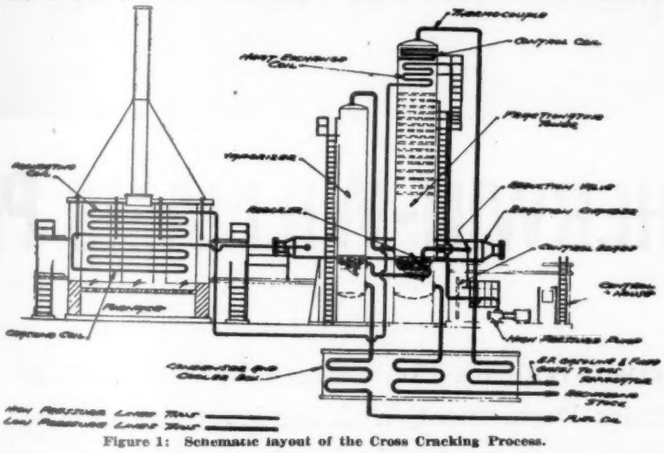

Figure 1: Schematic layout of the Cross Cracking Process.

The development of the cracking process has tended to cause the differential between the price of gasoline and any given heavy oil to become more or less constant. It may be assumed that the motorist will pay more for petroleum energy in the form of gasoline than will be paid by any other large consumer of petroleum products. Therefore, eventually the value of the heavier oils will be determined by their value when as much as can be is converted into gasoline, minus the cost of cracking determined from the costs of the least efficient large producer of cracked gasoline, and a reasonable profit determined by competition on the operation. At the present time, due to overproduction of crude, this condition exists only in part and we have another condition where the heavier oils are entering the heat producing field to compete on even terms with coal. The first condition may be brought about by under production, and the latter by overproduction of crude.

Economy of Operation

In the development of the art of cracking, as in every other industrial development, the pioneers reaped the spectacular returns. This should not discourage the real industrialist, the real refiner, however, for his returns are found in the good conservative management of well built and economically operated properties, rather than in occasional spectacular performances. To him the cracking plant will become as any other part of his refinery, but due to his more efficient use of his raw material by cracking, he will occupy a more advantageous position in the competition for crude and markets than his competitor without a cracking plant.

The cracking plant for installation today should, therefore, be considered primarily for the viewpoint of economies of operation, such as low labor costs, low fuel consumption, low maintenance and low material losses. Economies in these respects will enable a refiner to continue operations profitably during periods of reduced profits.

In the design of the Cross equipment particular attention has been paid to these points in the belief that the refiner has been surfeited with extravagant claims for unscientifically designed and poorly constructed equipment and will install his cracking plant on the basis of low cost production.

Developed Logically

The Cross process has been developed logically along a line of reasoning based on the fundamentals of physical chemistry. Cracking is a chemical reaction of a definite type, dependent on temperature and time. Under certain constant conditions of temperature the formation of the reaction products will proceed until a condition of equilibrium is reached and no further change takes place. The reaction progresses with diminishing velocity so that after allowing a reasonable reaction period it is best to remove the reaction products and start the cycle anew. Since the reaction proceeds rapidly at first, yields will be obtained even if the material is simply brought to the reaction temperature and then allowed to vaporize when the reaction stops. Since some of the molecules require a longer time for dissociation than others, operation in this manner requires repeated heatings to complete the cracking operation.

The principle of the Cross process is that of bringing the oil to be cracked to the proper temperature, while maintaining it in the liquid phase, allowing a sufficient reaction period, and then removing the oil from the reaction zone, separating the desired products and returning the remainder to the process for further treatment. The ease, safety, economy and rapidity with which this is accomplished will be described.

Description of Apparatus

Reference to the schematic flow chart shows that the Cross process may be divided into two parts; in the first the cracking reaction takes place, and in the second a complete separation is made of all the products by means of the heat remaining in the material and not used in the reaction.

The first part of the equipment is designed therefore to prevent the vaporization of the oil, with an accompanying reduction of temperature, so that as much as possible of the heat which is put into the oil may be used for cracking. It has been found that a pressure of between 600 and 700 pounds will prevent vaporization of gasoline at the cracking temperature of between 850 and 900 degrees. The oil in the cracking zone is therefore at all times in the liquid phase. The second part of the plant is designed solely to separate the reaction products from the unchanged material and consists of highly efficient distillation equipment which operates under a pressure of only 35 to 50 pounds.

The charging stock is picked up from storage by a low pressure pump and delivered to the high pressure pump which forces it against the operating pressure into the system. While passing through the heat exchange coil at the top of the fractionating or "bubble tower," it absorbs heat from the vapors surrounding the coil, consendses them and produces a reflux on the top tray. The stock temperature is increased to about 300 degrees. Passing now to the upper heating coil of the furnace its temperature is raised to about 550 degrees. The stack gases from the furnace are at about 700 degrees so that excellent fuel economy in the furnace is indicated. From the bottom row of the top bank of tubes the oil passes to the bottom row of the bottom row of tubes and flows upward through them parallel with the furnace gas flow. The oil leaves at a temperature between 850 and 900 degrees and enters the reaction chamber where the velocity is reduced and the cracking reaction takes place. The carbon, always a product of cracking, is formed and deposited here. Due to the quietness of the material in which the carbon is formed it is usually deposited in firm dense masses which may easily be removed.

Through Reaction Chamber

The oil passes slowly through the reaction chamber and at the end opposite the point of entrance is allowed to escape continuously through a manually operated valve of special design. Through this valve the pressure is released and the oil, now containing between 30 and 40 per cent of gasoline and the fixed gases, passes to the reboiler in the base of the fractionating tower. The temperature of the oil entering the reboiler is about 780 degrees Fahrenheit, and on leaving is about 650 degrees Fahrenheit. It will be noted that a drop of temperature has occurred while the oil passes through the reaction chamber, amounting to between 80 and 100 degrees. The heat lost in the reaction chamber has been used in the most part in reboiling the fractionating tower bottom to drive off any gasoline which might remain therein. A bypass is arranged so that only the desired amount of material is passed through the reboiler. The oil now enters the vaporizing tower where it is allowed to expand freely and in consequence the lighter portions which contain the gasoline, gas oil, etc., pass overhead, while the bottoms from this tower are the fuel oil. The gravity of the bottoms is subject to control by means or the reboiler bypass or by means of a small stream of recharging stock introduced into the tower. The fuel oil bottoms are drawn off through a cooler and to storage.

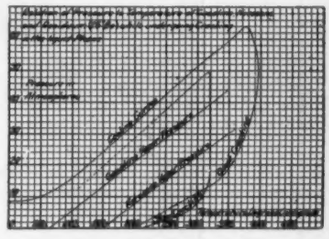

Figure 2: Relation of pressure to temperature on gasoline, kerosene and re-alduum (24 Be.) while undergoing cracking in the liquid phase. (By courtesy of the Kansas City Testing Laboratory.)

The overhead from the vaporizing tower enters the fractionating tower near

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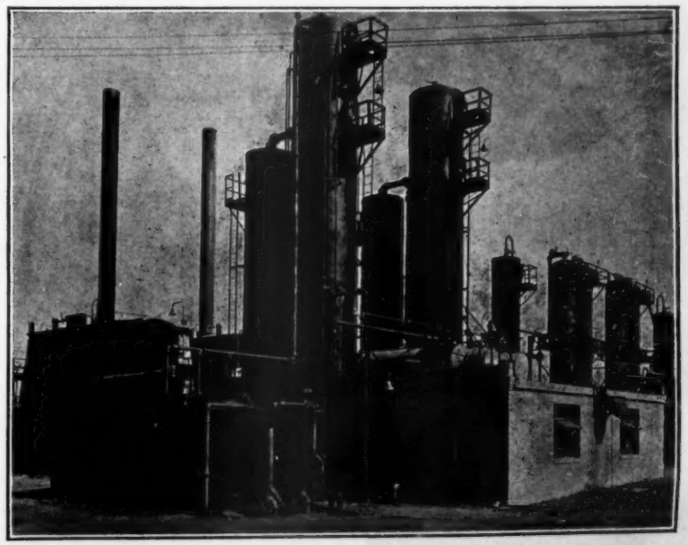
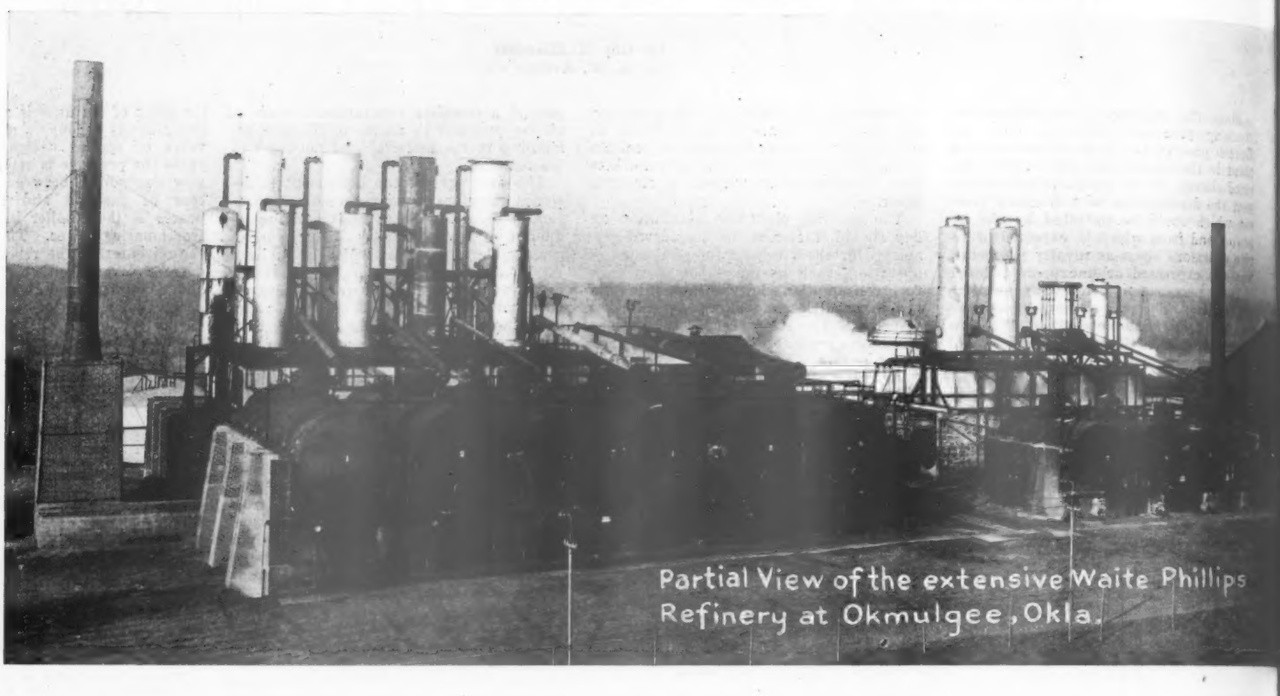


Figure 3: Two 1,000-bbl. Cross Units with fractionating towers in foreground at a North Texas refinery. The towers in the background are those on two 600-bbl. Cross units which have now been in continuous operation for over two years.

THE PAINT



Partial View of the extensive Waite Phillips Refinery at Okmulgee, Okla.

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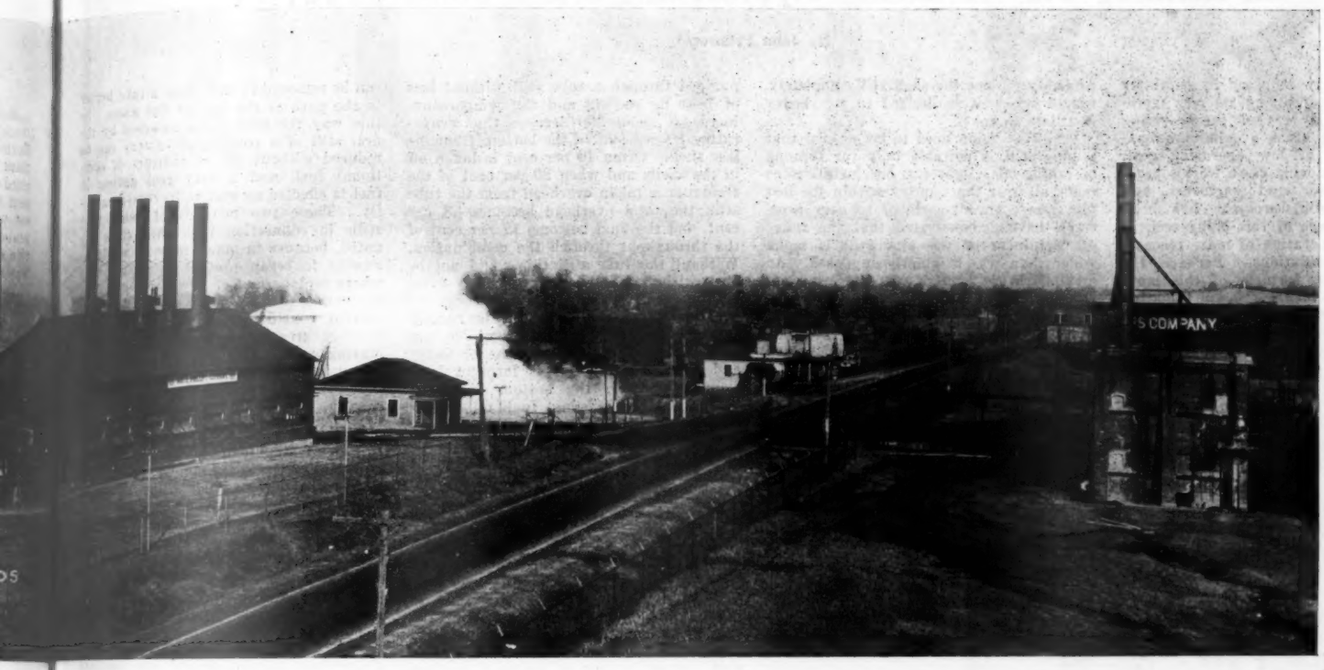

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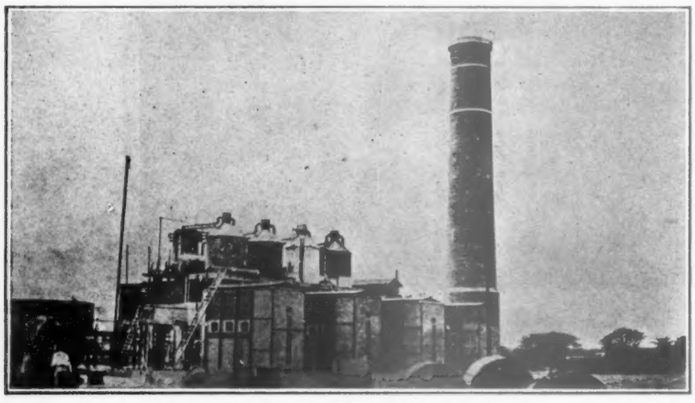
Increasing Usefulness of Pipe Stills

Progress Made in Adopting It for General Use as a Heating Element in Refining Oil. Efficiency Approaching Steam Boiler Practice

By John Primrose*

The oil refinery industry is genuinely interested in modernizing refinery methods with the end in view of recovering maximum yields from a minimum capital investment at low operating cost. Much thought is being given to this problem by chemists and engineers and already substantial progress has been made, the evidence of this being seen in the successful operation of more recently constructed installations. Perhaps the most outstanding features of this more modern equipment are the fractionating column, producing greater yields of close boiling point fractions direct from the first distillation, and the pipe still, supplying the heat required without overheating or burning the oil and utilizing heat in the fuel at an efficiency closely approaching modern steam boiler practice.



Tubular oil heaters installed in Mexico, April, 1921.

It is to be hoped that it will be of interest to review in a very general way the progress made in adopting the pipe still for general use as a heating element in refining oil.

Pipe or tube stills have been used for topping or skimming for many years, perhaps more extensively on the Pacific Coast than elsewhere. The Trumbull process, using a pipe still and vapor separating chamber, with an effective heat exchange conserving heat originally supplied by the tube still, is probably the best known and is a very efficient distilling unit. Satisfactory fractions are obtained without rerunning and with a much smaller consumption of fuel than is possible with a continuous battery of shell stills. Several other types of pipe still are known in California, where this type of distilling apparatus is extensively used in refinery work, and in 1919 the Department of the Interior published an interesting bulletin, 162, by J. M. Wadsworth, describing several of the best known types in details and giving valuable data on yields and operating costs.

Seeking Increasing Yields

The conventional shell still, however, continued to be generally used because not much was known of the capabilities of the pipe still, and it was looked upon with a certain amount of suspicion by refiners who had always used the shell type and knew its capabilities thoroughly. Conditions in the industry, however, have of late years forced refiners to investigate more carefully the possibilities of increased yields with reduced cost of fuel and maintenance, and as the pipe still excels the shell still in all these particulars, it is becoming much more extensively used and in the no distant future will probably replace the shell still completely, except where it is desired to run heavy distillate to coke.

The impression used to be general that a pipe still is suitable only for topping or taking off a light cut, but installations made all over the country within the last few years, for all sorts of refinery processes, have demonstrated that the range of usefulness of the pipe still is much wider than was originally supposed. As an illustration, a plant was put into commission about 12 months ago, consisting of three units of 5,000 bbls. per 24 hours each. Crude oil is supplied to the heaters from the heat exchangers and heated to a temparature sufficient to evaporate 90 per cent of the throughput. The hot oil and vapor from the tube stills are discharged into a vapor separating chamber where the vapor is separated from the remaining liquid which is drained off as fuel oil from the bottom of the chamber. The vapor passes out from the top of the chamber through the vapor line into a series of ractionating towers to the final condenser. The operation of the tube stills has been entirely satisfactory with a fuel consumption less than one-half what it would have been with shell stills, and the space occupied, initial cost and cost of maintenance are also very much in favor of the tube stills.

Operation of Tube Still

The operation of a tube still is, of course, continuous, the oil to be treated being pumped through the tubes of the still, heated and discharged into the vapor separating chamber where the vapor is separated and the operation is continued indefinitely. The operation of a continuous battery of shell stills is continuous in the same way, but if a deep cut is made, the bottom sheets of the last still are of necessity very hot because of the high temperature of the oil in the still, and consequently coke is produced, causing overheating of the sheets and necessitating shutting down for repairs. The time out of commission for repairs, as well as the cost of maintenance, is a serious item of refinery cost. In a tube still the oil under treatment is pumped through the tubes of the still at a speed which prevents formation of coke in the tubes, provided the furnace arrangement is proper. Consequently there is not overheating, and it is not necessary to shut down for repairs.

There is no loss of income from equipment being out of commission, and the cost of repairs is materially less. This has been amply demonstrated in practice in a number of installations of tube stills where the bottom from the last shell of a battery of continuous shell stills is pumped through a tube still without loss of heat by cooling and the temperature increased about 300 degrees, thus evaporating 80 per cent of the bottom from the last shell. Often 40 per cent is taken off in the shells and when 80 per cent of the residuum is taken overhead from the tube still, the total overhead becomes 88 per cent, and the final bottoms 12 per cent of the throughput through the combination. Without the tube still this could not be done without hazard of dangerously overheating shell stills. In such cases, the overhead from the tube still is usually gas oil or cracking stock, which can be separated into two streams of heavy and light oil by a simple form of fractionating tower, the bottom from the vapor separator being fuel oil. This combination illustrates very well one way of combining tube stills with shell stills already installed, thereby increasing the capacity and yield and reducing maintenance costs.

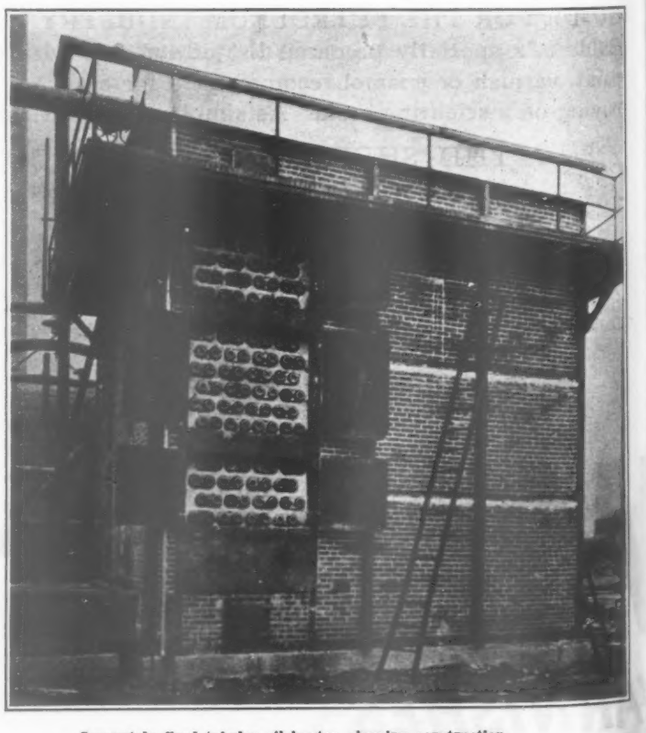
Installation Described

Installations of tube stills have also been made to relieve the work demanded of the first shell still of a continuous battery by installing a tube still to take the oil from the heat exchanger or the cold crude, supply the sensible heat to bring it up to the temperature of the first still, and all or part of the heat required to evaporate the first cut. The heated oil from the tube still is delivered into the first shell still of the battery, which will then reqiure only a very light fire. Oftentimes the first still of a continuous battery is called upon to absorb much more heat than any other still in the battery, and a much better balance between the different stills is obtained by easing up the work on the first still, thereby increasing the capacity of the battery. The flue gases from shell still batteries are usually at a high temperature and in considerable volume and contain sufficient heat for this purpose which can be removed by installing a tube heater in the path of the flow of flue gases. In this way the heat to be absorbed by the first still of a continuous battery can be reduced without the expenditure of additional fuel, and a very real saving in fuel is effected as well as increased capacity. These two methods of using tube stills in connection with shell stills are noted, because in many cases it would be unwise to scrap present equipment, but where replacement or new construction is contemplated, tube stills should be given careful consideration, because they will produce greater yields with smaller operating costs as well as a smaller initial investment.

Step-Up Distillation

A new refinery put into operation some months ago affords an interesting illustration of step-up distillation using tube stills in much the same way as a continuous battery of shell stills. This refinery depends entirely on the tube stills for its primary distilling unit. The crude first passes through vapor and liquid heat exchangers, where it is heated to about 300 degrees. At this temperature a light cut is obtained by passing through a vapor separator. The remaining crude is pumped to the first heater where it is increased in temperature 150 degrees Fahrenheit, and a second cut obtained at a temperature of about 450 degrees Fahrenheit by passing through a second vapor separator. The remaining crude at about 450 degrees is pumped through a second heater and the temperature increased another 100 degrees, at which temperature a third cut is obtained, the bottom from the third vapor separator being used for fuel oil. When desired a third heater can be installed and the gas oil in the bottom of the third separator recovered for cracking. At present this is not commercially advisable. The vapors from the second and third separators pass

(Continued on Page 214)

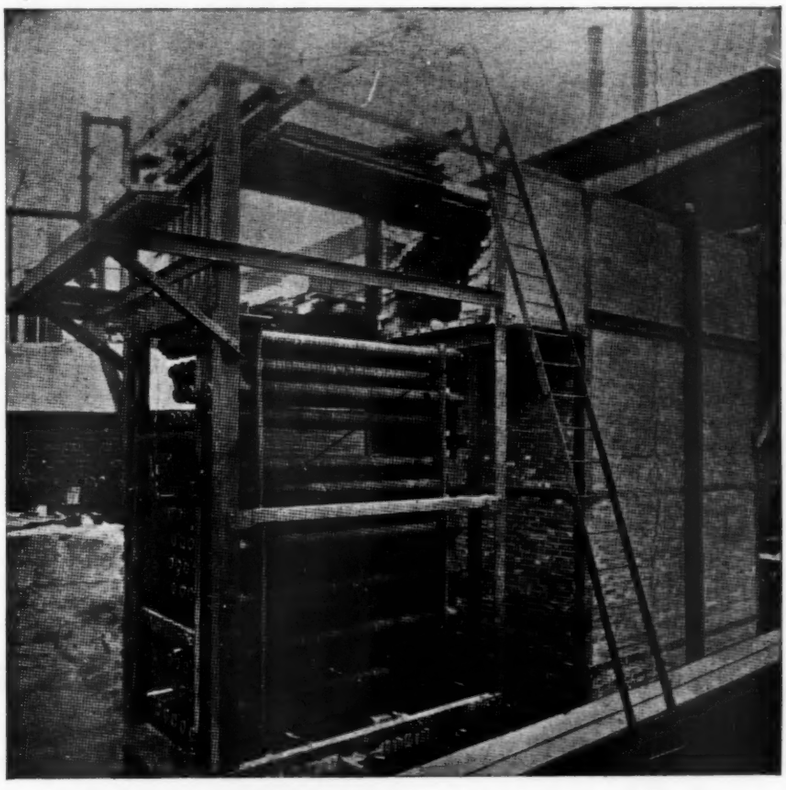


Separately fired tubular oil heater, showing construction.

*Vice president Power Specialty Co.

FOSTER

TUBE STILLS



Foster Tube Still Under Construction

Embody the most practical and scientific method of heating oil to all temperatures and pressures.

Eliminate the danger of overheating and damaging the oil by maintaining high velocity and even distribution of heat with correct design of furnace.

400 Foster Oil Heaters In Service

POWER SPECIALTY COMPANY

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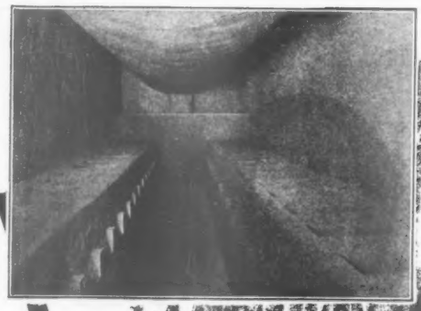
PLIBRICO

FURNACE LINING

Reg. U. S. Pat. Off.

for longer furnace life.....

One of the Plibrico-lined Schultz Process Vacuum Oil Stills at the Red River Refinery. The entire lining is of Plibrico. With this plastic refractory, the dog houses were easily built.



Furnace under one of the Red River stills in the course of construction. Note pockets in the common brick wall for anchoring the Plibrico.

A battery of completed Schultz Process Stills at the Red River Refining Co. They are all lined with Plibrico.

T. F. FLYNN, PRESIDENT — R. S. WATT, TREASURER
R. B. TODD, VICE PRES. & GEN'L. MGR. — R. A. FOUTS, SEC'Y & GEN'L. MANAGER
E. F. BUCHANAN, ASST. SEC'Y

Red River Refining Co., Inc.

PETROLEUM REFINERS

PLANTS: CRIGHTON, LA. · VIVIAN, LA. · EL DORADO, ARK. · BURNHAM, ILL.

GENERAL OFFICE: SUITE 810 MERCHANTS BLDG.

Shreveport, Louisiana

Burnham, Ill. December 16, 1924.

Plibrico Jointless Firebrick Co.,
1146 Clay Street,
Chicago, Illinois.

Gentlemen;

About two years ago a Plibrico salesman called upon us setting out the wonderful qualities of Plibrico. We were a little bit doubtful as to how it would work but felt that if it was half as good as it was represented to, it was a wonderful thing. We purchased one drum as an experiment and used it to repair some fire door arches that were continually falling down and the results we obtained were more than satisfactory. We next purchased twenty drums to repair a boiler wall and after 4years trial we decided to equip our entire plant with Plibrico.

Today all our stills and boilers are lined with this material and we feel that our furnace troubles are over. It is true that the initial cost is greater but the upkeep is nothing. We have not had a Bricklayer on the job since abandoning fire brick and our walls and arches to all appearances are as good today as when they were installed.

Any time that you have any doubting Thomases in your comp.bring them out and let them see for themselves.

Yours Truly
The Red River Refining Co.,
by R. S. Watt
Treas.

"Our furnace troubles are over"

You can end yours, too, with Plibrico

FIREBRICK linings under stills and boilers at the Red River Refining Co. had proved short-lived. They tried Plibrico. Now they use Plibrico Furnace Lining altogether, as Mr. Watts' letter tells. "Upkeep is nothing . . . our walls and arches are as good as the day they were installed"—that's what Mr. Watts says.

You can get longer furnace life by installing Plibrico. It's a plastic lining that is pounded in with a mallet and trimmed with a trowel. Anyone can install it—no skilled masons needed. It outlasts firebrick many times—cuts heat loss through the furnace wall.

Use Plibrico anywhere that firebrick is used. You'll like it for "doghouses" in stills, for arches and piers, for checker-hearths in oil burning installations, and for all special shapes, because it can be quickly pounded in to fit any shape. No special tile—no cutting of bricks.

Plibrico is ideal for repairing in still or boiler furnaces. Try it. See how it outlasts the firebrick around the repaired place.

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Plibrico is packed in cylindrical steel wooden-ended containers, as shown below, by a patented method which keeps it always workable.

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Dallas, Texas
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Kansas City, Mo.
Los Angeles, Cal.
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San Diego, Cal.
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—and in 71 other cities. At each city you'll find Plibrico engineers who will figure on your work or instruct your men in proper installation methods.

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Schulze Process for Making Lubs

Superior Oils Manufactured by Vacuum Distillation at Red River Refinery. Interesting Features in Plant Design and Operation

By K. Rankin

One of the biggest problems confronting the manufacturers of lubricating oil at the present time, as every refiner knows, is to prevent the cracking of the oil in the still with its consequent formation of unsaturated compounds and light fractions.

Three major factors cause this situation and considerable effort has been made to mitigate these in various ways. These are (1) high temperature; (2) the refluxing of materials that condense in the vapor line into the still and (3) local overheating of the bottom of the still.

As is well known, the usual method of trying to get away from these three conditions is to use steam in lub stills, so keeping the boiling point of the oil below the critical cracking temperature. Unfortunately, steam does not entirely accomplish its purpose while it has several objectionable features.

A method of vacuum refining which eliminates the use of steam entirely and, at the same time, eliminates once and for all overheating of the bottom of the still, is one that will have more than ordinary interest to refiners. This method absolutely prevents unduly high temperatures and minimizes refluxing material that may condense in the vapor line. John E. Schulze is the inventor of this method, which is now in use at Burnham, Ill., in the plant of the Red River Refining Co., Inc., as well as in many other plants throughout the country. A description of the Burnham plant may be of interest.

Description of Plant

The outstanding features claimed for this process of manufacturing lubricating oils are:

1. Low operating costs;
2. Minimum losses;
3. Extreme simplicity;
4. High yield of excellent quality, including high viscosity, grades comparable to cylinder stocks produced entirely by overhead distillation from cheap low grade fuel;
5. Acid treatment and filtering are entirely eliminated, costs and losses being reduced accordingly while the nuisance of handling acid sludge is eliminated;
6. Production of "narrow cut" oils (whose range of viscosity and boiling point are within much narrower limits than in the case of oil manufactured by other processes), combining a very high flash and fire test with a zero cold test;
7. The production of oils of excellent color that remain stable under heat because the unsaturated compounds and sulpho-acid bodies, which it is impossible to remove ordinarily from oils treated with acid and soda, are reduced to the minimum.

Stills Possess Unique Features

The ordinary lubricating oil still has a conventional vapor dome and a vapor line slanting downward from the still. Cracking of the oil occurs, also considerable turbulences, when steam is blown into the still, and droplets of oil are picked up and carried in the liquid state into the outlet in the vapor dome. Emulsification with its attendant trouble often occurs on account of the co-mingling of steam and oil vapors. These troubles are inherent of the conventional still.

The still designed by Mr. Schulze minimizes, if not actually eliminates, all these troubles.

Instead of the single vapor dome such as is used in the majority of lub stills, the Schulze stills have a plurality of domes spaced at equal distances along the top of the still. Each vapor line is heavily insulated and slants downward from the still instead of towards it. In this simple manner reflux is impossible. The joint from the horizontal to the upright section of each vapor line constitutes a square elbow which offers less surface than the round joint and so discourages condensation.

The thick covering of insulation on the vapor lines prevents condensation. Each vapor line runs to the condenser to which it is connected through a reduction equipped with its individual water-cooled coil in the conventional condenser box. Since no light cracked products are carried over, and no steam is used it is possible to employ less cooling surface than ordinarily required for the usual lub still. The light ends are more difficult to condense, of course, because more nearly of the same temperature as air.

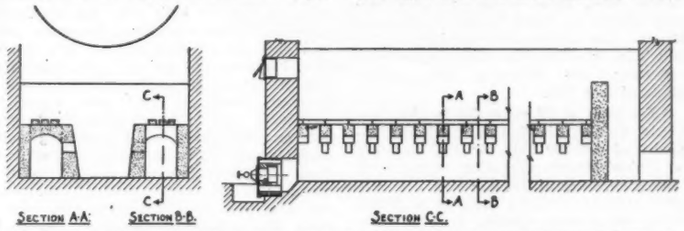

Figure 1: Sectional elevations of the oil fuel setting of the Schulze Process oil stills at the Red River Refining Co.'s plant, located at Burnham, Ill.

Each of these vapor lines carries an equal quantity of vapor. The use of many vapor lines offers the easiest and most direct outlet to the vapors. In this way the turbulence that ordinarily occurs as the vapor seeks to escape does not occur, hence cracking of the oil, which it causes, does not occur either. With the Schulze method practically all cracking and carrying over of entrained oil is prevented.

How the Process Works

All stills are connected to an electrically driven vacuum pump through the vacuum lines and six horizontally internally braced run down tanks. Any tank can be cut out of the system any time the vacuum is released.

The crude is charged into the still. About 240 bbls. constitutes a charge in the 320-bbl. still, and approximately 24 hours are required for running down the charge. The charge is heated close to the initial boiling temperature, about 300 degrees F., before the vacuum is applied. The vacuum employed is that corresponding to 29.9 inches of vacuum.

Each still is equipped with special apparatus for drawing and separating the incondensable gases and other harmful organic compounds during distillation.

Results

Asphalt or naphthene base crudes are used chiefly by Mr. Schulze, although he states that his process is equally adapted to handling topped Pennsylvania crude. Before Pennsylvania crude is charged into the vacuum still, however, the wax must be removed. This is best done by centrifuging.

The charge is heated close to the distillation temperature, or about 300 degress F., before the vacuum is applied. Pressure is then reduced to below 5 millimeters of mercury, absolute pressure, or better still, to 1 to 15 millometers, corresponding to 29.9 inches of vacuum. When the oil is free from moisture it is always feasible to get down to pressures as low as 2 to 4 millimeters, assuming, of course, the employment of an absolutely tight system.

The temperature of the oil in the still is carefully watched at all times, an electric pyrometer with its thermo couple being located within an inch or so of a central point in the still being used for this purpose. Directly distillate begins to come over, a sample is taken and its viscosity, flash and fire points accurately determined. Samples are taken at frequent intervals so long as distillation is continued, until the increase in viscosity indicates the desirability of cutting the distillate into a second receiver. The first cut is made up to the desired viscosity, when the pressure in the first receiver is released and the first cut pumped to storage.

Similar procedure takes place for the remainder of the distillation. Pressure is maintained around 1 to 1.5 millimeters, or, at any rate below 4 millimeters, for the best results, the distillate being cut for the desired fractions in accordance with the increase in viscosity as found from the test samples. Products aggregating 50 to 95 per cent of the volume of the topped crude originally charged into the still may be obtained as straight overhead distillate. The residue remain-

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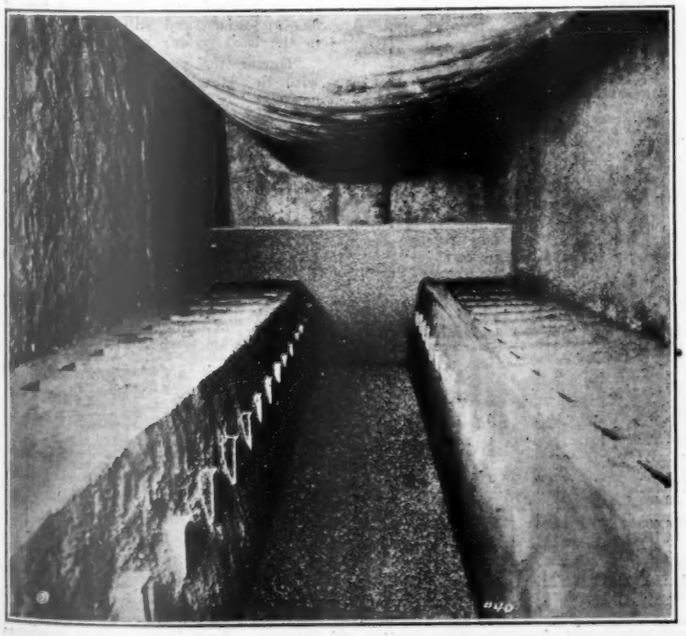

Figure 2: Interior of the Schulze Process oil still showing combustion tunnels called doc houses Front, side walls and baffle walls are lined with Pilbrico.

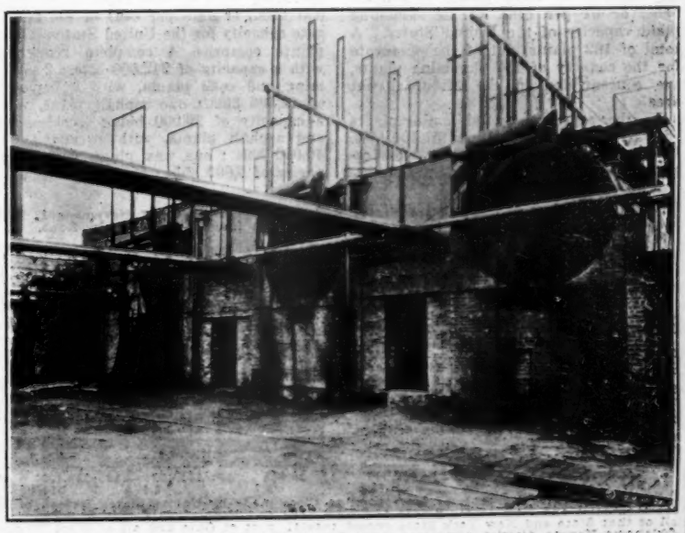

Figure 3: Battery of vaccum oil stills at the Red River Refining Co.'s plant.

Complete Refineries Near Coast Ports

Types of Plants as Listed in Government Report Are Segregated. Skimming Plants Located in Mid-Continent

By L. M. Fanning

Complete refineries, which comprise 54.8 per cent of the total operating refining capacity in the United States, are concentrated largely at coastal points, strategically situated from the standpoiint of utilization of the tanker both as regards receipts of crude oil and shipments of refined products to domestic and foreign markets. Virtually all of these refineries are also directly connected with the oil fields by trunk pipe lines. As regards relative importance with other types of plants, the complete refinery, therefore, both in the matter of dominating capacity and accessibility to markets, is having an increasingly vital bearing on some of the industry's economic problems.

Segregation of types of plants as reported by the United States Bureau of Mines as of November 1, 1924, shows that of the total capacity of 1,360,200 bbls. for the 55 complete refineries in operation, 27 plants, with a capacity of 527,200 bbls., are situated in California, practically all being at Pacific Coast ports; 8 refineries, with a capacity of 342,500 bbls., in the East Coast district, and 4 plants, with a capacity of 242,000 bbls., in the Gulf Coast district. In other words, California, East Coast and Gulf Coast districts account for 82 per cent of the total capacity for complete refineries.

Mid-Continent District

In the Mid-Continent district there are five complete plants, listed as operating, with a total capacity of 78,500 bbls., or amounting to only 5 per cent of the total complete refinery capacity of the United States.

Numerically there are more skimming plants than any other type of refinery in the United States. Out of a total of 357 refineries reported as operating 157 are listed as straight skimming plants. The Bureau of Mines also segregates under several divisions skimming plants running to lubs, asphalt or coke.

The total capacity of all operating refineries is 2,480,922 bbls., of which, as stated, 1,360,200 bbls., or 54.8 per cent are accounted for by complete refineries. Skimming plants have a daily capacity of 474,607 bbls., or 19.1 per cent of the total capacity, ranking second to complete refineries.

The Mid-Continent has the bulk of the skimming plant capacity. Total operating capacity of these plants is 293,600 bbls., or 61 per cent, of all skimming plant capacity of the United States. A total of 102 plants, out of the aggregate for the country of 157 skimming plants, are concentrated in the Mid-Continent area.

Further segregation of skimming plants shows 17, with a capacity of 57,300 bbls. in the Gulf Coast district; 11, with a capacity of 46,500 bbls., in the Indiana-Illinois district; 6, with a capacity of 7,000 bbls., in the Pennsylvania district; 14, with a capacity of 41,367 bbls., in the Colorado-Wyoming district, and 7, with a capacity of 28,800 bbls., in the California district. The East Coast district has no skimming plants.

California Ranks First

California ranks first among refining districts of the country in the matter of total operating capacity. Of a total of 357 refineries, with a combined capacity of 2,480,922 bbls., California has 55 plants, with a capacity of 654,320 bbls., or 26.4 per cent of the total capacity.

While the complete plants comprise by far the bulk of the refining capacity in California—527,200 bbls.—the State also has 19 topping plants, with a capacity of 72,820 bbls., these being the only topping plants so listed by the Bureau of Mines. The district also has besides 28,800 bbls. in skimming plant capacity in operation, one skimming and asphalt plant of 500 bbls.

Of a total of 22 refineries in the East Coast district, having a combined capacity of 462,200 bbls., or 19.2 per cent of United States operating capacity, 8, with a capacity of 342,500 bbls. are complete plants; 4, with a capacity of 20,000 bbls., are asphalt plants; 4, with a capacity of 58,000 bbls., are skimming and asphalt plants; 2, with a capacity of 20,000 bbls., are skimming, lub and asphalt plants; one, of 10,000 bbls. capacity, is a skimming, coke and asphalt plant; and 2, with a capacity of 8,700 bbls., are skimming and lub plants.

Total refining capacity in operation in the Mid-Continent district is 505,440 bbls., or 24.3 per cent of the country's total. The number of plants in operation is 134, out of a United States total of 357. Mid-Continent plants are divided geographically as follows: 76, with a capacity of 359,400, or 14.4 per cent of United States total capaicty, in Oklahoma-Kansas; 38, with a capacity of 101,250 bbls., or 4 per cent of the United States total, in North and Central Texas, and 20, with a capacity of 44,790 bbls., or 1.7 per cent of the total United States capacity, in North Louisiana and Arkansas.

Gulf Coast District

The Gulf Coast district, which also includes southwest Texas, has 42 refineries operating with a total capacity of 460,030 bbls., or 18.5 per cent of the aggregate capacity for the United States. These plants comprise 4 complete refineries, with a capacity of 242,000 bbls.; 2 skimming and coke plants, with a capacity of 12,500 bbls.; one asphalt plant, with a capacity of 20,000 bbls.; 3 skimming and asphalt plants, with a capacity of 40,000 bbls.; one wax plant, with a capacity of 5,000 bbls.; one skimming, coke and asphalt plant with a capacity of 20,000 bbls.; 4 skimming and lub plants, with a capacity of 50,000 bbls.; 17 skimming plants, with a capacity of 57,300 bbls.; 8 lub plants, with a capacity of 10,230 bbls.; and one skimming, lub and coke plant, wit ha capacity of 3,000 bbls.

The accompanying tables are based on the United States Bureau of Mines list of petroleum refineries as of November 1, 1924, and the operating refining capacity has been segregated by the districts which are used by the bureau in reporting its monthly production of United States refineries.

In its separation into types of plants the bureau explains the divisions as follows: Complete plant—one manufacturing gasoline, kerosene, gas and fuel oils, lubricating oils, paraffin wax, petroleum coke, asphalt or both coke and asphalt; skimming plant—gasoline, kerosene, gas and fuel oils; Skimming and lub, gasoline, kerosene, gas and fuel oils, lubricating oils; skimming and asphalt—gasoline, kerosene, gas and fuel oils, asphalt; skimming and coke—gasoline, kerosene, gas and fuel oils, coke; skimming, lub and asphalt—gasoline, kerosene, gas and fuel oils, lubricating oils, asphalt; skimming, lub and coke—gasoline, kerosene, gas and fuel oils, lubricating oils, coke; wax plant—gasoline, kerosene, gas and fuel oils, lubricating oils, paraffin wax; lub plant—gas and fuel oils, lubricating oils; asphalt plant—distillates, gas and fuel oils, asphalt, and topping plant—tops, distillates, gas and fuel oils.

Operating Refineries

The daily crude capacity of the refineries operating in the United States with the percentage of each district as compared to the entire capacity of the country follows:

Complete Plants

	Barrels	Per Cent
California	527,000	39
East Coast	342,000	26
Gulf Coast	242,000	17
Pennsylvania, Indiana, Illinois	120,000	9
Mid-Continent	79,000	5
Rocky Mountain	50,000	4

Skimming Plants

	Barrels	Per Cent
Mid-Continent	293,600	61
All others	181,000	39

By Refining Districts

The table of refineries operating by refining districts, with the daily average capacity in barrels, follows:

	Barrels	Per Cent
California	654,300	26.4
East Coast	462,200	19.2
Gulf Coast	460,000	18.5
Oklahoma-Kansas	359,400	14.4
Indiana-Illinois	171,600	6.9
Colorado-Wyoming	134,400	5.4
North and Cen. Texas	101,250	4
Pennsylvania	93,000	3.7
N. Louisiana-Arkansas	44,800	1.7

Operations by Types

The table showing refineries operating by types with the daily average crude capacity in barrels, follows:

	Barrels	Per Cent
Complete types	1,360,200	54.8
Skimming plants	474,600	19.1
Wax plants	142,300	5.7
Skimming and asphalt	1,230,000	5
Skimming and lub	105,300	4.3
Topping plants	72,800	3
Skimming and coke	67,000	2.8
All others	135,700	5.5

Humble Co. Chairman Quits, on Ambition To Retire at Fifty

Avowing ambition to retire at the age of 50, the press of private interests and a hint of possible political activity, R. S. Sterling, chairman of the board of the Humble Oil & Refining Co., tendered his resignation at the annual stockholders meeting. Mr. Sterling had been actively identified with the Humble company as president since its inception until two years ago, when he was elected chairman of the board.

Mr. Sterling's letter to the stockholders follows:

"In retiring from the activities of the Humble Oil & Refining Co. I think it fitting that I refer to the plans which I discussed with the board of directors some six or seven years ago; that is, that it was my intention when I reached the age of 50 to retire from the activities of the company, and I have seen no reason for not carrying out these plans. However, though I shall no longer be active in its management, I am retaining the bulk of my investment in the company, as I know of no other in which I have as much confidence as I have in the Humble Oil & Refining Co.

"I attribute the remarkable success of the Humble Oil & Refining Co. to the character of the men constituting its board of directors and the hearty spirit of cooperation which has been manifested throughout the entire organization by its stockholders and employes.

"In asking that I not be reelected an officer or director of the company and that I be relieved from active duties, I feel no hesitancy in saying that the company is so well organized in all of its branches that it is able to carry on in the same degree of efficiency that it has heretofore and will not be affected in the least by my retirement.

"During the years of my connection with the Humble company my private business has largely increased. The demands upon my time, and at least two important public matters to which I am giving a great deal of personal attention, make it necessary for me to slow down in some direction to some extent.

"In addition to the reasons above suggested, the splendid organization of the Humble Oil & Refining Co. and my full faith and confidence in its officers and

(Continued on Page 156)

United States Refineries Operating as of November 1, 1924. Classified by Types and Segregated by Refining Districts

Type of Plant—	East Coast: Number of Plants	East Coast: Daily Average Crude Capacity, Bbls.	Pennsylvania: Number of Plants	Pennsylvania: Daily Average Crude Capacity, Bbls.	Indiana-Illinois: Number of Plants	Indiana-Illinois: Daily Average Crude Capacity, Bbls.	Okla.-Kans.: Number of Plants	Okla.-Kans.: Daily Average Crude Capacity, Bbls.	N. Ce nt. Texas: Number of Plants	N. Ce nt. Texas: Daily Average Crude Capacity, Bbls.	N. La.-Ark.: Number of Plants	N. La.-Ark.: Daily Average Crude Capacity, Bbls.	Gulf Coast: Number of Plants	Gulf Coast: Daily Average Crude Capacity, Bbls.	Colo.-Wyoming: Number of Plants	Colo.-Wyoming: Daily Average Crude Capacity, Bbls.	California: Number of Plants	California: Daily Average Crude Capacity, Bbls.	Total Number of Plants	Total Daily Average Crude Capacity, Bbls.	Per Cent of Total Capacity
Complete	8	342,500	4	23,500	6	96,500	5	78,500	..	.....	..	.....	4	242,000	1	50,000	27	527,200	55	1,360,200	54.8
Skimming and Coke	..	.....	..	.....	3	11,000	3	14,500	..	.....	..	.....	2	12,500	1	29,000	..	.....	8	67,000	2.8
Asphalt	4	20,000	..	.....	..	.....	..	.....	..	.....	..	.....	1	20,000	..	.....	1	500	7	41,700	1.7
Skimming and Asphalt	4	58,000	..	.....	..	.....	..	.....	..	.....	..	.....	3	40,000	..	.....	1	25,000	8	123,000	5.0
Skimming, Lub and Asphalt	2	20,000	..	.....	..	.....	..	.....	..	.....	..	.....	..	.....	..	.....	..	.....	2	20,000	0.9
Wax	1	3,000	32	49,115	4	11,700	9	59,500	2	9,500	..	.....	1	5,000	1	4,500	..	.....	51	142,315	5.8
Skimming, Coke and Asphalt	1	10,000	..	.....	..	.....	..	.....	..	.....	..	.....	1	20,000	1	8,000	..	.....	3	38,000	1.1
Skimming and Lub	2	8,700	14	12,950	2	5,600	6	20,000	1	6,000	1	2,000	4	50,000	..	.....	..	.....	31	105,250	4.3
Skimming	..	.....	6	7,000	11	46,500	50	166,700	34	84,750	18	42,190	17	57,300	14	41,367	7	28,800	157	474,607	19.1
Lub	..	.....	1	400	1	300	..	.....	1	1,000	1	600	8	10,230	..	.....	..	.....	12	12,530	0.5
Skimming, Lub and Coke	..	.....	..	.....	..	.....	2	19,000	..	.....	..	.....	1	3,000	1	1,500	..	.....	4	23,500	1.0
Topping	..	.....	..	.....	..	.....	..	.....	..	.....	..	.....	..	.....	..	.....	19	72,820	19	72,820	3.0
Total	22	462,200	58	92,965	27	171,600	76	359,400	38	101,250	20	44,790	42	460,030	18	134,367	55	654,320	357	2,480,922	100.0
Per cent total capacity		19.2		3.7		6.9		14.4		4.0		1.7		18.5		5.4		26.4			

NOTE—District segregations correspond to those made by United States Bureau of Mines in compiling its monthly report of refinery operations. East Coast includes Maryland, Massachusetts and New Jersey plants and New York and Pennsylvania coastal refineries, also Rhode Island, South Carolina, Georgia and Virginia. Pennsylvania district comprises all of that State and New York State except coastal, part of Ohio and all of West Virginia. Indiana-Illinois district comprises those States, also Kentucky, part of Ohio and Minnesota. Oklahoma-Kansas district comprises those States, also Missouri. North and Central Texas and North Louisiana-Arkansas are self explanatory. Gulf Coast includes South Texas, South Louisiana, also Southwest Texas and Arizona. Colorado-Wyoming district includes those States, also Montana and Utah.

VALVES KNOWN FOR ABSOLUTE DEPENDABILITY IN OIL FIELDS and REFINERIES

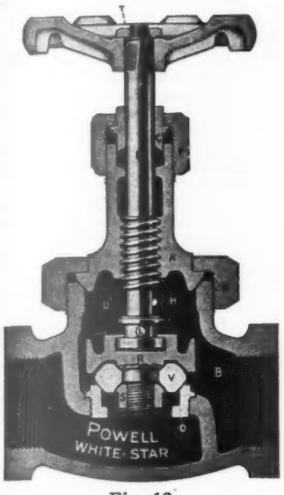

Fig. 12
WHITE STAR GLOBE VALVE

Renewable Seat and Renewable Reversible Disc. For 200 or 300 lbs. Working Steam Pressures. Sizes ¼" to 3".

Fig. 3100
DROP FORGED STEEL BODY GLOBE VALVE

Monel Metal Stem, Disc, Seat and Bonnet. For high temperature and working pressure up to 800 lbs. Disc and seat are regrindable and renewable. Sizes ¼" to 2".

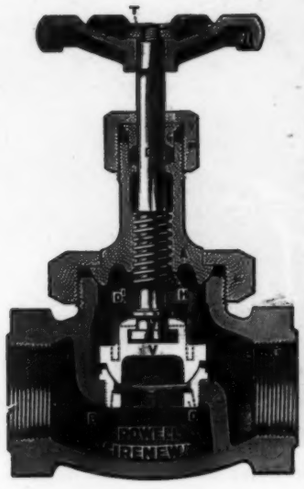

Fig. 190
"IRENEW" GLOBE VALVE

All parts renewable. Iron Body Brass Mtd. or All Iron. Working pressure up to 150 pounds. Sizes ¼" to 3".

Powell Valves

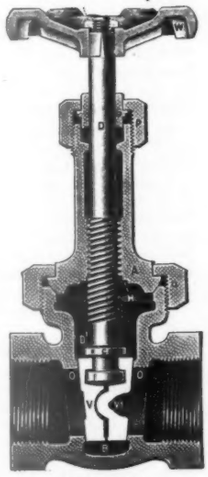

Fig. 375
WHITE STAR GATE VALVE

Double wedge discs of non-corrosive White POWELLIUM NICKEL. Steam working pressure up to 200 pounds. Sizes ¼" to 3".

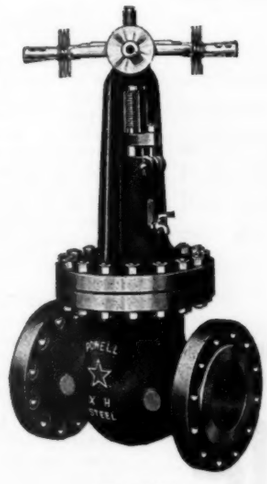

Fig. 3416

Monel Metal trimmed Gate Valve for 400 lbs. W.S.P. 750°F. total temperature. Conformed directly with American Steel flange standards developed by A.E.S.C.

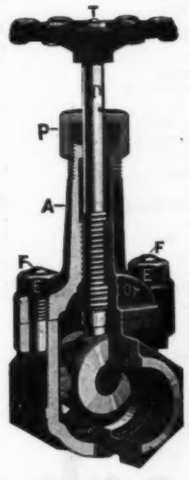

Fig. 460
IRON BODY "PILOT" GATE VALVE

Steam Bronze Trimmings. Working pressure up to 125 pounds. Sizes ½" to 3".

Purchase Real Economy on Your Next Valve Requisition
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Business looks good for refiners. With volume and profits ahead, it is poor policy to struggle along with inefficient and inadequate equipment — the greater your volume the more you lose.

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Carbondale Refrigerating Machinery for Refiners

CENTRAL WEST

(Continued from Page 56)

and a flush of 147 bbls. Just south of Cygnet, in the northeast quarter of Section 7, Bloom Township, Wood County, Maxwell & Harkness drilled in their No. 32 located 800 feet from the south line and 700 feet from the west line of the H. Gatfield farm and struck a 30-bbl. well at a total depth of 1,505 feet, or around 300 feet in the Trenton. Deep drilling is being done in most of the wells along this area, which is known as the "Hogs Back or Sucker Rod Belt" where the top of the Trenton lies about 1,120 to 1,160 feet below the surface.

In Eagle Township, Hancock County, between Findlay and Lima, Porter & Hovis drilled in No. 15, located 1,000 feet from the south line and 250 feet from the east line of the Lem Aurand farm, in the southwest quarter of Section 5, getting a 25-bbl. flush well. In the northwest quarter of the same section Dave Kirk, Jr. and others' No. 14, located 600 feet from the north line and 1,000 feet from the west line of the Eli Gorby farm, pumped 5 bbls.

In Jennings Township, Van Wert County, the Stanley Oil Co.'s test, 250 feet from the north line and 750 feet from the east line of the William Shiley farm, in the northeast quarter of Section 28, pumped 5 bbls. after given a shot, adding some virgin territory to the field.

In the Elmore Field, in Harris Township, Ottawa County, the Reynolds Oil Co.'s No. 5, located 700 feet from the south line and 1,300 feet from the west line of the Ross Reynolds farm, in the southwest quarter of Section 13, proved the lightest well yet drilled on this farm, which produced but 2 bbls. from a depth of 1,307 feet.

South of Findlay, in Hardin County, the Roundhead Oil & Gas Co. struck an exceptionally fine producer in its No. 5 on the Erwin Hites farm, in McDonel Township, 1,500 feet from the south line and 300 feet from the west line of the farm. The well struck top of the Trenton at 1,442 feet and drilled 57 feet in to a total depth of 1,499 feet, where it produced a flush of 80 bbls. In the same township, the Allie Moore Oil Co.'s No. 1 John Ward farm, struck top of Trenton at 1,437 feet and drilled in 50 feet to a total depth of 1,487 feet, with only a small showing of oil. This well has been capped and will stand for a time and if better showing is had later, may be put on the pump, otherwise it will be abandoned. In Roundhead Township, same county, the Ohio Oil Co.'s wildcat in the northeast corner of the Manuel Hoover farm, struck top of the Trenton at 1,440 feet and drilled 50 feet in to a total depth of 1,520 feet, and proved a duster. With better weather considerable new work will start in Hardin County as well as Darke and Shelby Counties, all to the south side of the old Trenton Rock Field.

Indiana Field

The old Indiana Field is in for an active drililng campaign as soon as the weather improves, especially within the area known as the Indiana gas belt, for the reason that the pay sands are found at a greater depth in Trenton than was the case when the gas wells were drilled years ago. Much of this territory has been overlooked, but now this area will come into play, as did the Hotmire Pool in Jay County a couple years ago. There are still thousands of locations yet to be drilled in the defined areas, but nothing but small wells can be expected. Madison County, according to information, is being pretty well leased up, as some years ago some large producers were found there in the Alexandria Pool, and others pools will be looked for.

Illinois Field

One of the likeliest points for active work in the Illinois Field with the advent of spring, is in the Allendale area of Wabash County. This section is spotted but when a well is found it is usually above the average producer, although a dry hole can be found on almost all sides of a good producer.

The only completions reported from Illinois during the week were two in Wabash Township, Wabash County. The Max Oil Co.'s second test, 2,000 feet from the north line and 1,600 feet from the east line of the Holson & Dorney farm, in the southwest quarter of Section 18, produced 45 bbls. initial production the first 24 hours at a total depth of 1,570 feet. Wirebaugh & Ballard's No. 1 in the northeast corner of the H. A. Price farm, in the southeast quarter of Section 23, pumped 40 bbls. from a depth of 1,498 feet, both wells getting their oil in the Biehl sand.

Central Ohio Field

Five completions were reported for the week from the Central Ohio Fields, of which one was a dry hole and four were gas wells. There were three new locations made and five new wells started drilling. High waters have caused a partial shutdown throughout the gas section as well as where oil is being found.

In Monroe Township, Holmes County, the Ohio Fuel Gas Co.'s test on the L. W. Harford farm, Lot 13, showed but a light flow of gas and will be abandoned. The Empire Gas & Fuel Co. struck a fair gas well at No. 1 W. C. Bird farm, Lot 7.

In Carthage Township, Athens County, Waldon and others' No. 2 on the Kate Evans 37 acres, Section 3, is a light gas well at a depth of 1,237 feet. William Hawkins and others' are drilling No. 6 located 1,050 feet from the south and east lines of John J. Gaston farm, Section 23.

The Logan Gas Co. made a location for a test well 890 feet from the south line and 360 feet from the east line of the J. R. McConnell 87 acres, Section 4. Same company made a location for a wildcat well 1,290 feet from the north line and 645 feet from the east line of the Henry H. Thudium 45 acres, Lot 2, New London Township, Huron County. This test will be watched with much interest, being quite a distance in advance of production.

The East Ohio Gas Co. made a location 300 feet from the south line and 1,400 feet from the east line of the G. and J. Harrols farm of 70 acres, Section 28, Columbia Township, Lorain County, and is the second to be drilled on this farm. Daugherty Brothers have started the drill at a test on the southeast corner of the F. C. Adkins 13 acres, Section 34, same township, and in the same area the Empire Gas & Fuel Co. has started drilling its test on the southeast corner of the Thomas Armstrong 12 acres, Section 31. The Wiser Oil Co. has a well under way on the northeast corner of the L. Ring 14 acres, Section 32.

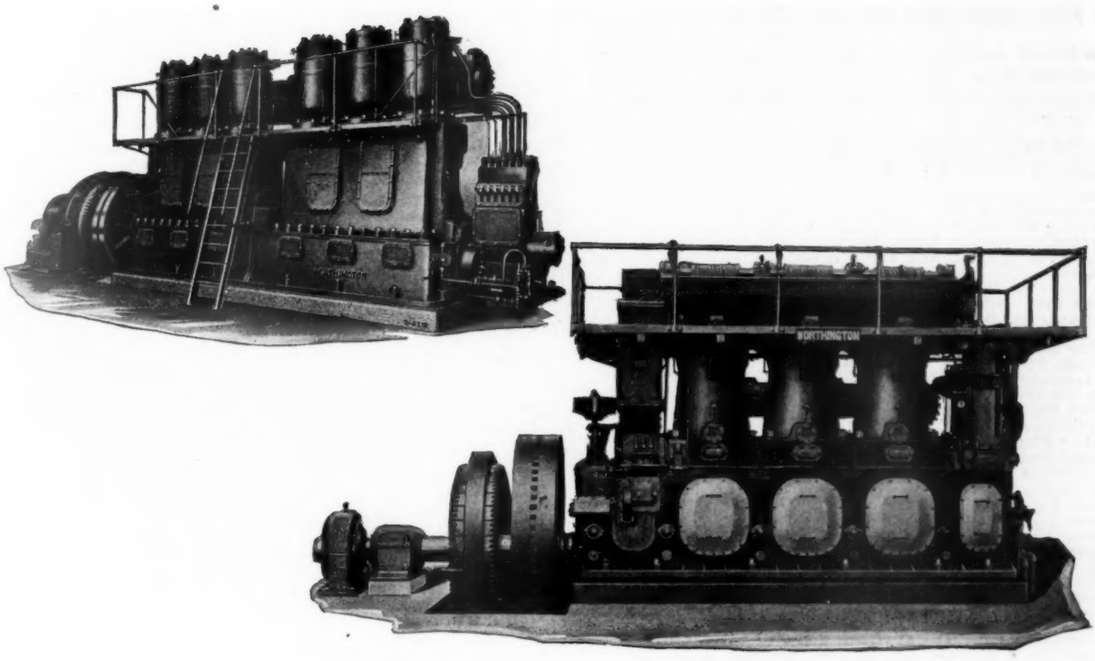
In Monroe Township, Holmes County, the East Ohio Gas Co. is drilling No. 1 on the F. C. Close farm, Lot 9. Stevens and others are drilling No. 14 on the Stephen Arnot 275 acres, Lot 35, York Township, Athens County. East Ohio Gas Co. is drilling No. 2 G. Stelter farm, Section 3, Strongville Township, Cuyahoga County, and Russell, Beal & Vandergrift are drilling No. 2 on the J. B. Crawford 126 acres, Section 5, Lodi Township, Athens County.

Offside Developments

In Jefferson Township, Knox County, the Upham Gas Co. drilled a fair gas well at No. 1 J. F. Blubaugh farm, Section 12. In the same township, the East Ohio Gas Co. struck a gas well above the average at No. 2 on the S. J. Brous farm, Section 14, and drilling No. 2 on the J. J. Reed, better known as the Armstrong farm, Section 14, Brown Township, same county.

The J. S. Dinsmore estate drilled in a 1,000,000-foot gas well at No. 1 on the Harvey Rowland farm, Section 29, Balow Township, Washington County, at 907 feet and in the Maxon sand. In Decatur Township, same county, Dunham Brothers have had trouble with collapsed casing and then fishing for bailer at No. 2 Phoebe Barrows farm, Section 34. This well was drilled to a depth of 1,273 feet and shot.

The Ohio Fuel Supply Co.'s No. 1 E. and M. Allen farm, Section 1, Jackson Township, Knox County, shows for a 4-bbl. well in the Clinton sand. Late reports from the Craig Cochran well in Lot 9, Howard Township, Knox County, was that it had reached a depth of 4,300 feet.



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Niagara Fire Ins. Co., New York, N. Y.
North British & Mercantile Ins. Co., London, England
Norwich Union Fire Ins. Soc., Norwich, Eng.
Palatine Insurance Co., London, England
Patriotic Insurance Co. of America, New York, N. Y.
Pennsylvania Fire Ins. Co., Philadelphia, Pa.
Phila. Fire & Marine Ins. Co., Phila., Pa.
Phoenix Assurance Co., London, England
Phoenix Insurance Co., Hartford, Conn.
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Among the purposes for which the Oil Insurance Association were organized are:

To enable oil operators to secure sufficient dependable insurance to adequately protect their interests;
To furnish property holders and those controlling oil businesses expert engineering and inspection service, so methods of insuring this class may be standardized, and efficient fire protective devices installed and properly maintained, thereby stabilizing the business to the point which will enable insurance companies generally to accept the class at fair cost and under equitable policy rates;
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TREND IN CALIFORNIA PETROLEUM REFINING

(Continued from Page 65)

valves with Monel trimmings to a very great extent in places where the failure of a valve might cause trouble. Steel fittings are also customary where hot oil is handled, even at low pressures. Calorized pipe is being used in some cases for the rows of pipe in the retort coil which are exposed to the direct action of the hot flue gases.

Treatment of Product

In the treatment of the raw products from the distillation plant the same tendency as has been shown in distillation has been followed. That is, continuous treating. Some of the gasoline produced can be marketed without any treatment other than an agitation with either raw or acid treated California clay. Most of the gasoline, however, requires a light acid treatment which is usually followed by the clay treatment.

Considerable difficulty was experienced with the gasoline produced from crude oils from the Signal Hill and Torrance Fields when this oil was first being run, and numerous different treatments and methods were tried out to make a gasoline which would not turn pink or brown or green on standing after treatment. This trouble has been gradually overcome by varying the percentage of acid, alkali and time of treatment in those precesses using this method, and also by the use of California clay for the neutralization of the oil after the acid wash.

There are a number of clay deposits in California which are now being worked. The clay after mining is given an acid treatment or is simply ground and marketed in its raw form. These clays bring a price of from $25 to $60 per ton delivered in Los Angeles, the price depending on the efficiency of the clay as a filtering agent.

Clay Used in Filtering

In the utilization of this product alone, clay ground to 200 mesh, is fed continually into the stream of gasoline. This mixture is then pumped to some suitable type of agitator, usually mechanical, to avoid the losses due to air agitation. After a short agitation, the mixture is pumped through filter presses when the clay and sludge are filtered out and the gasoline pumped to storage. At intervals the presses are cleaned out and the clay discarded, although there is considerable work now being done on the regeneration of this clay. Figure 5 shows a flow sheet of this process.

In treating gasolines which are not amenable to the clay treatment alone, a light acid treatment of one-half to three pounds of acid per barrel is first given the oil, usually in the old type of agitator. After sufficient agitation and settling the sludge is withdrawn and clay added in sufficient quantities to thoroughly neutralize and clarify the oil, after which the mixture is pumped throguh a filter press for the removal of the spent clay.

A Continuous Process

For the use of the straight acid and alkali treatment of light oils, there has been considerable work done and considerable headway made in the development of a continuous process, and at present there are at least two plants which are treating continuously large amounts of gasoline by this method. A number of the companies have found it advisable to continue the use of the old type agitator rather than to change to the new type of treater.

The production of lubricating oils from California crudes presents some very considerable difficulties and as a consequence of this, with but very few exceptions, this work is in the hands of the larger companies. The first of these difficulties has been the supply of crude. It will be remembered that until very recently the San Joaquin Valley and its contiguous territory produced a large percentage of the California crude and that most of this production was controlled by the larger companies. Shortly after the flush production started coming in in the Los Angeles Basin, most of the small independent refiners began looking to these fields for their crude supply, and the low yield of lubricating stock as well as the amount of amorphous wax renders this crude unfit for the economic removal of lubricating oil from it, with the result that the most valuable crude for lubricating oils still remains in the hands of the large companies. Then there is the prejudice, which is gradually being overcome, against western lubricating oils for some purposes. These facts, coupled with the fact that, due to its complexity, the production of lubricating oils from California crude requires a large plant investment with a consequent high cost of operation, have kept all but a very few of the smaller refiners from going into the manufacture of lubricating oils. All of the larger companies, however, are now engaging in the manufacture of lubricating oils on a large or small scale and, as a result of the large amount of experimental work which has been done, the oils being produced today are better than ever before. The development of the use of the various California treating clays has played a large part in the development of lubricating oil processes. A

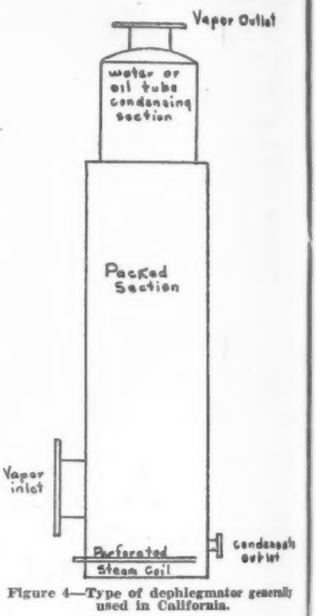

Figure 4—Type of dephlegmator generally used in California.

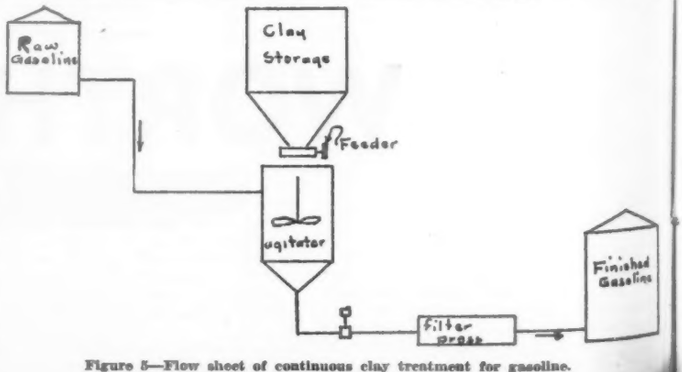

Figure 5—Flow sheet of continuous clay treatment for gasoline.

This Job Shows the Strength of a Wilson Weld

It was a 5-ton cast iron pinion that had given 22 years of service in Jamaica, B. W. I. Its end had come—or would have come, except for the *welding* of its spokes into solid pieces again. The extent of the repairs is indicated by the use of 240 pounds of No. 12 Wilson Color-Tipt Welding Wire. And the perfection of the welding is proved by nearly three years' service since, without the slightest appearance of defect. This job shows the strength of a Wilson Weld — and the worth of Wilson Welding Machines and Welding Wire wherever machinery is used or wherever separate pieces of metal should be made into one solid unit. If you are not profiting by the use of Wilson Welding—or if you want to know how Wilson Welding will save you money, have your engineers consult with ours.

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number of the large companies have even purchased and developed their own clay deposits, as well as methods for the treatment of the clay to fit it for use in the various processes.

Cracking Held Back

Development along cracking lines has been almost at a standstill for the past three years until within recent months, although most of the larger companies have kept up their laboratory and experimental plant work along these lines during this period. The reason that practically no plant work has been done, has been that with the flood of production we have seen in California in the past three years, there has been a flood almost of equal proportions, of gasoline, on account of the high gasoline content of most of this oil. The larger companies, who always naturally take the lead in such costly development work as cracking, are only just now beginning to install and operate cracking plants, or to reopen those plants which were in operation prior to the time the light oil production in California started, and which have been shut down since that time.

On account of the widely different characteristics of California oils, as compared to those of other parts of the United States, the cracking of California oils presents some very interesting problems, and it is with much interest that the various refiners are watching the results being obtained in the plants of two of the most widely advertised cracking processes. These plants have been in operation only a comparatively short time, but by the time it is necessary for all up to date refiners to have cracking plants in operation, sufficient data should be available from the operation of these two plants to set at rest any doubts the refiner in California may have as to the applicability of either process to his particular problem.

WHAT BUREAU OF MINES DOES FOR THE REFINER

(Continued from Page 98)

were collected in almost every important city in the country. After an analysis had been made of the results of that survey it was found it would be necessary to secure samples from only a few important marketing centers in order to get a fairly accurate idea of the quality of gasoline marketed throughout the country. Since 1919 samples have been collected twice a year from those cities that were found to be representative of the quality of gasoline marketed in the different sections.

Judging from the number of requests that have been received for copies of the reports on the semiannual gasoline surveys, the refiners as well as the marketers and consumers are very much interested in this phase of the bureau's work.

Examination of Crude Petroleums

For the past few years the Bureau of Mines has been collecting and analyzing samples of crude oil from all the important fields in the country and in a number of cases from the different producing sands in the various fields. An attempt is made to secure samples from each new field that is discovered and to publish the results of the analysis as soon as possible. This information is of value to the refiner as he is able to determine whether the crude is suited to his particular needs.

The bureau has issued a number of reports giving the analyses of crudes from the different producing districts in the United States. Samples of crude oils have been obtained from a number of the important foreign fields and reports will be issued from time to time covering the results obtained as a basis of comparison with typical American crudes. A report giving the analyses of crude oils from Canada, Mexico and South America is now in the course of preparation. This report will doubtless be of interest to a number of refiners, particularly those on the Atlantic and Gulf coasts for it is possible the refiners in those districts will depend more and more on imported oils as a source of supply for their plants.

All the samples of crude oil have been analyzed according to a standard method that has been adopted by the bureau and the analyses are therefore comparable. These analyses enable an experienced refiner to form a fair idea of the refinery value of crudes that he has never handled and afford a most valuable guide as to the relative merits of such crudes which may be available to his plants.

Quality of Products

The bureau is also making an exhaustive study of a few typical crudes of the country by using samples of sufficient size that the various products, such as gasoline, kerosene, lubricating oils, etc., can be made in sufficient quantities that they can be tested by standard methods to determine the quality of the products obtained. The information obtained from such a study will be of great importance in indicating the method to be followed in the refining of crudes of different types.

Other work on which the bureau is engaged is of more immediate interest to refiners than some of the problems mentioned. For example, the refiners are interested in the work leading to improvements in equipment for the fractional distillation of petroleum, methods of separating wax from wax distillate, preparation and testing of lubricating oils from different crudes, and in methods of treating petroleum distillate particularly those obtained by pressure distillation.* It is not possible in a brief article of this kind to cover the work of the Bureau of Mines on each problem that is of interest to the refiner but it is hoped that the examples cited will suffice to show that the problems of the refining industry have not been overlooked by the bureau in planning its research.

*The work of the bureau on these problems has been discussed in some detail by F. B. Tough in a recent article relating to the work of the bureau during the year 1924. The Oil and Gas Journal, Vol. 23, No. 36, January 29, 1925, p. 144.

PURCHASES EQUIPMENT

The Wichita Gasoline Co., of Breckenridge, Texas, which has been operating a natural gasoline pressure absorption plant, recently purchased engine and compressor equipment from Clark Brothers Co., general sales agents for the Gas Engineering & Construction Co.

TO TAX TOURISTS' GASOLINE

The gasoline tax in the province of Quebec, created last year with a view primarily of taxing American tourists who come to Quebec, will be increased to 4 cents per gallon compared to 2 cents, the tax at present. From April, 1924, to December, the provincial treasury received $425,508 from the tax on gasoline.

FREIGHT CHARGES ON GASOLINE

	In Cents per 100 Lbs.		
From—	To Chicago	To Des Moines	To Minneapolis
Whiting, Ind.	....	31	39.5
E. Chicago, Ind.	....	31	39.5
Wood River, Ill.	17.5	31	31
Roxana, Ill.	17.5	31	31
Kansas City, Kans.	32.5	24	37
Sugar Creek, Mo.	32.5	24	37
Group 2, Kansas	36	29.5	43
Group 3, Oklahoma	36	32	43
El Dorado, Ark.	36	33	43
Shreveport, La.	36	33	43
New Orleans, La.	36	50.5	61.5
Galveston, Tex.	38.5	35.5	45.5
Beaumont, Tex.	38.5	35.5	45.5
Wichita Falls, Tex.	38.5	35.5	45.5
Casper, Wyo.	51	46	65
New York, N. Y.	47.5	65.5	64.5
	—In Cents per Gallon—		
Whiting, Ind.	....	2.046	1.947
E. Chicago, Ind.	....	2.046	1.94
Wood River, Ill.	1.155	2.046	2.046
Roxana, Ill.	1.155	2.046	2.046
Kansas City, Kans.	2.145	1.584	2.442
Sugar Creek, Mo.	2.145	1.584	2.442
Group 2, Kansas	2.376	1.947	2.838
Group 3, Oklahoma	2.376	2.178	2.838
El Dorado, Ark.	2.376	2.178	2.838
Shreveport, La.	2.376	2.178	2.838
New Orleans, La.	2.376	3.333	3.465
Galveston, Tex.	2.541	2.343	3.003
Beaumont, Tex.	2.541	2.343	3.003
Wichita Falls, Tex.	2.541	2.343	3.003
Casper, Wyo.	3.366	2.970	2.970
New York, N. Y.	3.135	4.323	4.257

PIPE LINE CHARGES ON CRUDE

From Bartlesville, Okla., to—	Transportation	Cts. per Bbl. Gathering Charge
Bayonne, N. J.	76¾	20
Baltimore, Md.	76¾	20
Cleveland, Ohio	63½	20
Findlay, Ohio	61¼	20
Franklin, Pa.	64¾	20
Marcus Hook, Pa.	75	20
Oil City, Pa.	67¼	20
Philadelphia, Pa.	76¾	20
Pittsburgh, Pa.	64¾	20
Olean, N. Y.	65	20
Sugar Creek, Mo.	30¾	20
Whiting, Ind.	46	20
Wood River, Ill.	37¼	20

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Globe No. 682

Write for Bulletin No. 108-B

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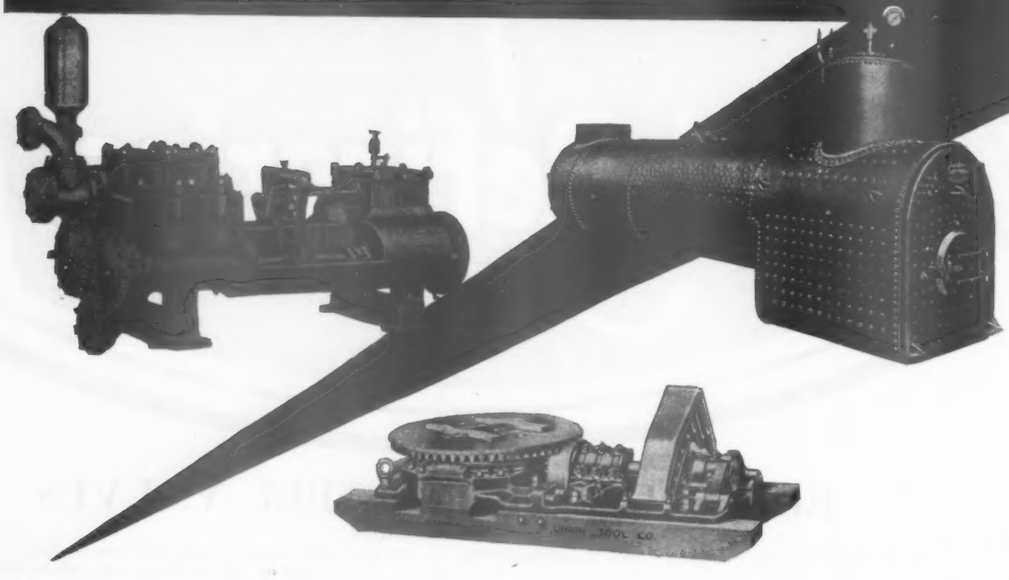

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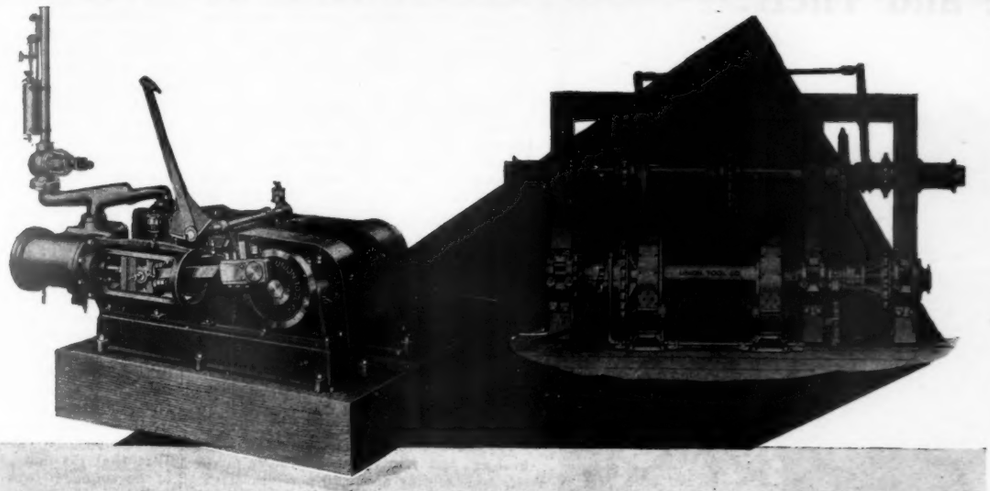

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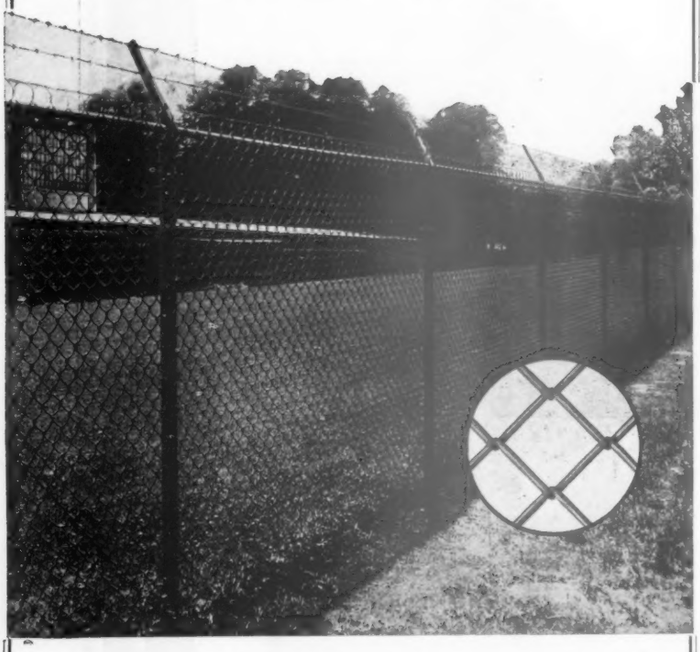

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109

NATURAL GASOLINE INDUSTRY FROM THE STANDPOINT OF CONSERVATION

By D. E. Buchanan

Presented at joint meeting Arkansas Petroleum Club and Louisiana-Arkansas Division Mid-Continent Oil and Gas Association, at El Dorado, Ark., Feb. 18

Conservation is a broad term. As an economic and political term it has come to mean in America the preservation of our natural resources for economic use, so as to secure the greatest good to the greatest number.

A sound policy of conservation does not require that our natural resources be hoarded miserly for the use of some future generation, but that they be developed and used to serve the human family in an economical way for the greatest good to the greatest number.

There was a time in the annals of the oil industry when billions of cubic feet of gas and thousands of gallons of gasoline were being wasted into the air every day in order to enable the producer to acquire the oil. The discovery and development of natural gasoline has eliminated to a great extent this terrific economic loss.

When we view the natural gasoline industry in the light of conservation we see first the manufacture of approximately 900,000,000 gallons of gasoline from natural gas last year. This enormous quantity representing about 10 per cent of the total consumption plus exports, would have been lost had it not been for the natural gasoline industry. To place a true economic value on this 900,000,000 gallons of gasoline, we must also take into account the enormous quantity of refinery product made usable as high class, satisfactory motor fuel, the product of cracking stills and improved fractionating devices, which, except for natural gasoline could not have been used for motor fuel.

Certainly we are speaking conservatively when we say that this would add another 900,000,000 gallons or make a total of 1,800,000,000 gallons of additional motor fuel made available through the medium of natural gasoline in the year 1924.

Start of the Industry

Necessity was the mother of invention in the natural gasoline industry as is the case with most others. The discovery of gasoline in natural gas was not, however, the result of an effort to increase the available supply of gasoline but came through the necessity of eliminating the objectionable operating conditions resulting from the presence of gasoline in the gas. Natural gas distributors found it necessary to remove the gasoline condensate from high pressure lines early in the history of the transportation of natural gas for fuel purposes and before there was any commercial demand for the natural gasoline so removed. For a time it was generally wasted or used as boiler fuel on the leases. This was before the advent of the internal combustion engine and during the time that gasoline was a byproduct in refinery operation. At that time crude oil was run through refineries for its kerosene content and the gasoline fractions were allowed to escape into the air as vapor.

With the coming of the automobile the demand for gasoline soon surpassed the demand for kerosene and the entire theory of refinery operation changed. With the increased use of gasoline the natural gasoline industry grew until in 1911 the Bureau of Mines first recognized it as a real factor in the gasoline situation, and for that year they recorded the production of 7,400,000 gallons of natural gasoline, the first recognition given the product by that body. At that time, while the industry was seven years old, and there was invested in it about $2,000,000 the production for the whole year was less than one-third the gasoline we now consume on a hot summer day. At this time, only 13 years later, there are about 1,200 plants, with between $150,000,000 and $200,000,000 invested in the industry, and the production this year will probably be between 900,000,000 and 1,000,000,000 gallons.

In 1911, when the natural gasoline industry was getting its start there were 639,000 automobiles in the United States. We produced that year 200,000,000 bbls. of crude oil from which 1,000,000,000 gallons of gasoline was manufactured. This billion gallons would have furnished each of the 639,000 automobiles with 1,500 gallons per car. Since the average consumption per car was only 450 to 500 gallons per year, it is quite obvious that the new industry, making a new kind of gasoline from natural gas, faced serious handicaps. Not only was there plenty of gasoline without this new kind but there were no generally accepted standard specifications. The product was wild and considered very dangerous to handle. There was little or no uniformity of quality and a strong general prejudice against it from most all directions. In the struggle to build a new industry, there is usually little cooperation. Each follows his own individual ideas as to plant equipment and plant operations; hence the product itself is nearly always the last thing to be standardized, and it was not until 1921 that the industry reached the stage of development where it was felt that sufficient cooperation could be obtained among the manufacturers to make successful a general move toward standardization of specifications.

Organize Association

In April of that year quite a large number of manufacturers met in Tulsa and organized the Association of Natural Gasoline Manufacturers. Standardization of product received their first and most earnest consideration and their efforts have brought very beneficial results, not only to the natural gasoline industry, but to the entire petroleum industry, as well. Today when you order a car of any of the five grades of natural gasoline, you know just what you are ordering and what you are going to get. The industry has very definitely passed the experimental stage and is now in "quantity production."

From the crude inefficient plant of the early day, operated as a side line and capable of extracting only a small fraction of the gasoline content, we have the modern plants of today, operated by men especially trained in the technique of gasoline extraction. Because it is even yet a new field of endeavor and the future possibilities are still great there has been drawn into the natural gasoline industry some of the highest class trained technicians available.

Since 1911 the natural gasoline industry has produced approximately 4,270,000,000 gallons of gasoline, valued at $545,000,000.

Vacuum on Old Areas

An estimate of the value of the natural gasoline industry, as concerns the conservation of our petroleum resources, which fails to take into consideration the beneficial effect of vacuum on old oil producing areas is incomplete and it is unfortunate that there are no data available giving this information in definite concrete form. There are still those within the industry who hold the application of vacuum for the purpose of removing casinghead gas does not increase the ultimate total recovery from the wells, but merely increase the rate of recovery. There are also those who hold that the application of vacuum to certain loose and porous sands would be detrimental to the production of oil. These views have been advanced by eminent authorities and have had the support of many experienced operators. They must therefore be based on evidence of no little weight. Nevertheless, a study of the production records of some of the old settled fields, comparing the production per well before and after vacuum was applied, and extending these production curves for the indicated life of the properties under both conditions, seems to be conclusive evidence that vacuum has not only accelerated the rate of production, but will in the end in-

Foamite 40-gallon Engine safeguarding property of the Hull-Ferren Gasoline Plant at Stroud, Okla.

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The two models of the Metered Type Engine are shown on this page. Model DM, wide tread, is the last word in portable protection where the apparatus may be required to cover fire hazards over a considerable outdoor area. It is a most effective supplement to a *Foamite* System.

Model FM, narrow tread, is ideal for safeguarding indoor hazards or local outdoor areas around refineries, gasoline plants, oil and grease warehouses, bulk stations, docks, etc.

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Another important contribution to the protection of the oil industry is the *Foamite* 5-gallon Hand Extinguisher. This fills a real need for use on fires too large for a single 2½-gallon Extinguisher but not large enough to require a 40-gallon Engine. The 5-gallon Extinguisher discharges about 45 gallons of Firefoam at an effective range of 35 feet. See illustration.

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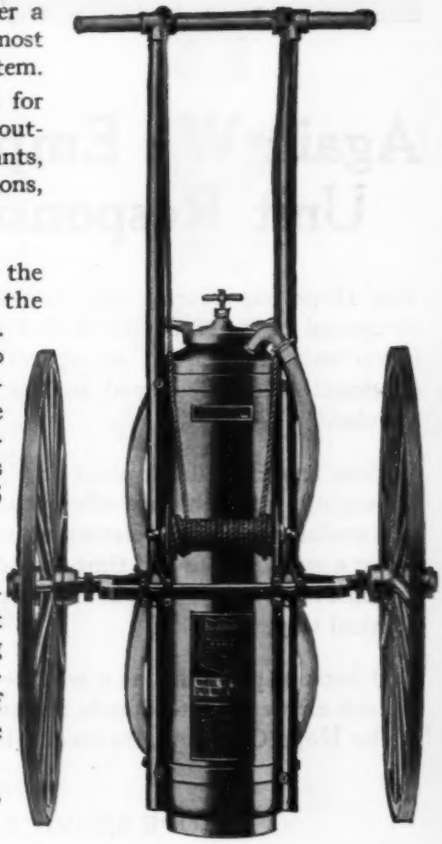

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Narrow-tread Model FM Foamite Metered Type 40-gallon Engine

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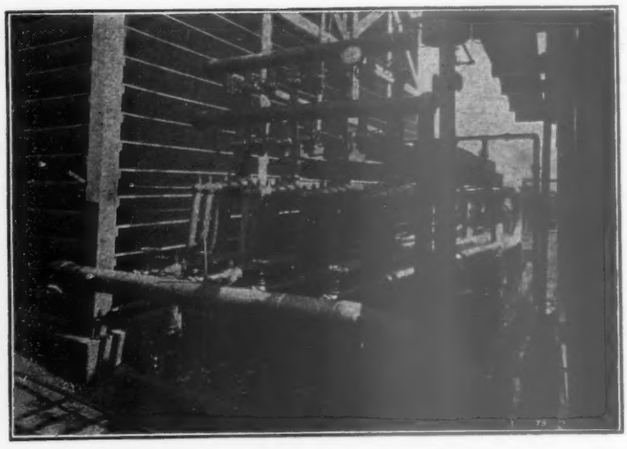

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crease the total recovery from the sands.

Most of us have seen the reaction that takes place when the cap is suddenly jerked off a bottle of white rock water or ginger ale. The gas which has been held in solution as a liquid under pressure immediately returns to gas when that pressure is released and in its rush to get out of the bottle where it may find equilibrium and enjoy itself in its original gaseous state, it carries with it, mechanically, so much of the liquid contents that it boils over unless the operator be an experienced one.

What Happens in Oil Sand

I believe it is generally accepted that this is just about what happens when an oil sand held under high rock pressure is tapped and the well flows. It even foams like the bottle of soda water. Of course, this is not true, where the well is flowing under hydrostatic pressure. After a time, usually all too soon, the gas has spent itself to the extent that there is not sufficient pressure to flow the well and it is put on the pump. That well will produce oil, naturally, so long as there is sufficient gas pressure on the sand to force the oil to the well. Under all the theories that can be brought to bear, vacuum properly and uniformly applied cannot help but have a beneficial effect. Oil will move through the sand when, and only when, there is a pressure differential and a vacuum on the well is gong to increase the differential and pull the gas to the well, and when it comes it will bring some oil out of the sand with it. Those who hold that vacuum is an asset to the production of oil are of the opinion that in cases where it has not proven beneficial the fault has not been in the fact that vacuum was applied, but rather with the inefficient and irregular manner in which it was applied.

Vacuum and Small Wells

It is estimated that there are in operation approximately 225,000 wells producing from one-half to two barrels per day. Accurate data are not available on all these wells, but based on the complete information we do have on some of the old fields, I believe I am safe in saying that 80 per cent of these small wells are producing under vacuum and it is also probably not an exaggeration to say that if this vacuum were to be discontinued these small wells would not produce at all. At least their production would be cut in half. There are a few isolated cases where the gas from vacuum plants is not sold, but in almost every case the sale of the gas for gasoline extraction not only pays for the expense of maintaining the vacuum, but turns the operation of the vacuum plant into a profit to say nothing of the increased recovery of oil.

Therefore, in addition to the enormous quantity of high test gasoline manufactured from the aroma of petroleum and the large additional quantity of refinery product thereby made useable as motor fuel, we credit to the natural gasoline industry this undeterminable quantity of oil, produced as a direct result of vacuum, because the natural gasoline industry has created a market for the gas which more than defrays any expense to the producer in pulling the vacuum. There are many cases where, over a period of time, the producer realizes more through the sale of the gas than for the oil produced on the lease. There are many fields where the oil operator could well afford to give the gas to the gasoline plant operator in return for a vacuum on his wells, because if the gasoline plant shut down he would have to supply the vacuum himself if he would keep his wells alive. At any rate he could afford to share the expense with the gasoline manufacturer.

There is a point beyond which the gasoline plant operator should not be required to go in pulling vacuum, because the benefit beyond that point accrues solely and directly to the production of oil. But this is not the time nor place to discuss that feature. Those who depreciate the value of vacuum on a producing property, we call attention to many of the old fields where the gas is practically exhausted and the production of oil in paying quantities under present methods and without vacuum would not be possible, consequently it would be an economic waste.

Engineers and scientists tell us we leave 75 to 80 per cent of the oil in the sand by present production methods. All right, the oil is there, held in the sand by capillary attraction. Vacuum not only tends to counteract the capillary attraction but it has the effect of pulling light gasoline fractions out of the oil in the form of vapor, and those vapors are reconverted into liquid and made available to the public as gasoline. This 75 to 80 per cent of residue oil will remain in the sand until we reach the economic period when it will be of sufficient value that we can afford to force it out of the sands by air pressure or water flooding, or until we resort to mining methods.

Why not then, in the meantime, extract as much of the gasoline as we can by vacuum, and through the sale of the gas so recovered keep the property alive? Those of you who are familiar with the West Virginia Field know that there they are pulling vacuum on a large number of old wells which have not produced a barrel of oil for five, and in some cases 10 and 15 years, but they are getting from five to ten bbls. of gasoline per well per day. The vacuum is simply pulling the light gasoline fractions out of the oil which is being held by the capillary attraction of the sand, and what they can't pull out by vacuum will stay there until they flood it out or go down and mine the sand.

Conservation of our petroleum resources will of necessity command our most earnest attention from now on. Many estimates of the life of oil production in this country have been made. Some of them have already, in the history of events, been proven erroneous, but we cannot evade the issue that we are gradually exhausting these resources. While many, many millions of barrels of oil will be produced by present methods from present producing areas and no doubt new fields will add their millions of barrels, we are undoubtedly facing the time when we will resort to the use of air and water, or other artificial pressure, and then to mining to recover the oil left in the sand by present production methods and to extract the oil in shale deposits. It is not unreasonable, therefore, to assume that natural gasoline, the very cream of petroleum, will become a more precious product and be in ever increasing demand from year to year.

PENN-MEX FUEL CO. PIPE LINE COMPLETED

PITTSBURGH, Pa., Feb. 21.—The Penn Mex Fuel Co., operating in conjunction with the Transcontinental Oil Co. (Standard Oil Co. of New Jersey) on the big Paciencia tract in Mexico, has completed the 10-inch pipe line from the Paciencia property to connect with the Transcontinental Oil Co.'s trunk line from the Cacalilao Field to Tampico, and will begin running oil through the line next week. This will furnish an outlet to the Penn Mex Fuel & Transcontinental Oil Co.'s big production.

The two companies are drilling jointly four wells in the big tract and all down about 1,500 feet. No. 10, which his about 3,500 feet southeast of the original pool, got a good showing of oil in the San Felipe Lime at a depth of 1,400 feet. They did not stop to test but are drilling on the lower sands and expect a gusher.

They are building two 55,000-bbl. tanks on the Paciencia tract and the pipe line when put into commission will have a capacity of 40,000 bbls. a day. The Penn Mex Co. has not had very smooth sailing in its Mexican operations but the outlook at this time is promising.

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GASOLINE KEROSENE NAPHTHA GAS OIL DISTILLATE FUEL OIL ROAD OIL

GEOLOGICAL GUIDANCE TO PETROLEUM REDUCING HAZARDS OF WILDCATTING

By Mead S. Johnson
Geologist

A geologist must have more than the ability to examine and map out a structure or anticline when he sees it. His work will extend into the actual drilling operations and oil development end of the game. He must be broad mentally and be able to arrive quickly at geological features of the area investigated.

If he is without definite rules to guide him in discovering oil pools, his usefulness is much less than it otherwise would be and the operator must hunt for new pools blindly, so that his chances for success will be reduced and the average outlay for such new pools as he may find will be greatly increased. Of course, random drilling has discovered many great oil fields, and persistent prospecting without geological guidance would ultimately find many new pools, but this procedure is indeed expensive, as the cost for drilling dry holes in the United States, is now running about $81,000,000 each year. The most effective assistance in locating undiscovered fields is an accurate and thorough knowledge of the conditions of the fields that have already been developed.

By the application of geology to petroleum prospecting, the hazard of wildcat operations has been reduced from one chance in 150 to one chance in three. Past records show that 658,059 wells have been drilled in the United States during the past 65 years, and that 133,435 of these prospects were failures. It is estimated that $581,000,000 was spent on drilling 305,465 wells during the past 10 years and that 64,633 dry holes resulted. In other words, dry holes completed have cost about $81,000,000 each year now, with but little hope of reduction in sight. But, if wildcatting would cease and the oil man would lose interest in the eternal search for petroleum, consumption would soon overtake production.

One-Fourth Wells Dry

Oklahoma has already produced, with 1924 figures, about 1,680,000,000 bbls. of petroleum, one-seventh of all the oil produced by the world. Leaseholds to the number of 4,779 bought for the purpose of drilling for oil or gas were tested with the drill in Kansas, Oklahoma, Texas, Louisiana and Arkansas in 1923 and nearly half of the test wells drilled were dry. In most cases the leases had been acquired on geological advice, that there was a reasonable chance they might prove productive.

In 111 counties in the five States mentioned nothing but dry holes were drilled. Two hundred and forty-five expensive failures in all. Eleven counties in Kansas were given 23 tests, 11 of which were dry. Twenty Oklahoma counties were explored and 37 dry holes resulted. In 14 north central Texas counties 46 dry holes were drilled and no oil or gas found. In 13 east central Texas counties 27 wildcats were drilled with no showing of either oil or gas. Thirty-three counties in the Gulf Coast, south central Texas and southwestern Texas were tested, with 68 wells, and all were barren of oil or gas. In 13 Arkansas counties 24 wildcast were drilled, only dry holes resulting. Seven north Louisiana counties were given 20 drilling tests, all of which were dry. In 29 counties in the various States under consideration the percentage of dry holes was more than 66. In other words there were 614 tests drilled in 29 counties with the following results: Oil wells, 120 or 19½ per cent; gas wells, 41 or 6 4/5 per cent; dry holes, 453 or 73.7 per cent. Add the results of the wildcat drilling in the 29 last mentioned counties to that in the 111 counties in which there were nothing but failures and we have the following rather startling totals and percentages, from 859 tests in 140 counties: Oil wells, 120 or 13.9 per cent, gas wells 41 or 4.8 per cent, dry holes 698 or 81.3 per cent. About one-fourth of all the wells drilled in the United States each year are dry, and the money spent on them is absolutely lost forever. About the only ones who profit by such adventures is the driller, tool dresser, teamsters and casing crew. It makes a fair living for them while the work is going on.

The United States contains about 2,000,000,000 acres of land. Of this amount, 2,000,000 acres, so far, have produced oil in commercial quantities.

What Ages Produce Petroleum

Petroleum has been produced from many geological ages. About 57 per cent of the world's production comes from the Tertiary strata, and more than 25 per cent comes from the Carboniferous. The remaining 18 per cent comes chiefly from the Cretaceous, Devonian and Ordovician.

The chief Tertiary fields in North America are those in California, Texas, Louisiana and Mexico. The Tertiary has produced about 2,000,000,000 barrels of oil. All of the fields in Russia, Rumania, Galicia, Peru and the Dutch East Indies, produce from the Tertiary formation.

The commercial production from the Paleozoic rocks is confined to the North American Continent. In the Mid-Continent Field oil is produced from the Pennsylvania, which has produced about 350,000,000 bbls. In the Appalachian Field oil is obtained from the Devonian and Mississippian beds. The Mississippian has produced 780,815,070 bbls.

Oil is produced from the Ordovician in the Lima, Indiana, Field. The Ordovician has produced over 378,095,570 bbls. In Illinois oil is obtained from the Mississippian. Oil has been produced from the Devonian and Silurian formations in New York and Ontario. The Devonian has produced about 590,304,235 bbls.

In Wyoming, Colorado, Mexico and the Gulf Coast region we find oil being produced from the Cretaceous, which formation has produced about 50,000,000 bbls. So that we have a very wide range of geological ages from which petroleum has been produced. The lack of important production from the Permian, Triassic and Jurassic rocks is doubtless due to the lack of original organic material in the case of these formations in this country, but in other parts of the world where such rocks are, at least in part, abundantly filled with organic mattet it is possibly due to the lack of exploration and development.

The stratigraphic occurrence of hydrocarbon minerals in the United States is by no means limited; on the contrary petroleum in the solid, liquid or gaseous form is found in greater or less quantity throughout the range of strata from Cambrian to the younger members of the Tertiary series. In portions of Oregon and Washington, small amounts of oil and gas have been produced from rocks assigned to the Eocene and Miocene series.

Regardless of the wide distribution of fluid hydrocarbons the conclusion does not necessarily follow that accumulations of oil or natural gas may be found in any area of sedimentary rocks for such accumulations take place only where all the essential conditions governing origin, adequate storage facilities and favorable structure are fulfilled.

Not Found in Metamorphic Rocks

Igneous and metamorphic rocks are sometimes called crystalline rocks; they are in general quite compact and hard. In no case have they been found to contain important deposits of oil or gas. This is mainly due to their low porosity and unfavorable conditions for the formation of oil or gas in such rocks.

Crystalline rocks, chiefly granite, underlie all of Kansas and in the central part of the State rise to within a relatively short distance of the surface, a fact which has had a very important bearing on the search for oil and gas.

Since heat and great pressure, which are associated with the making of metamorphic rocks, are so great, it is very

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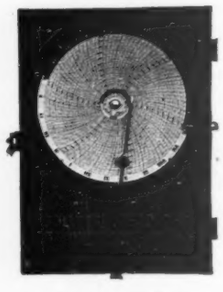

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likely that any oil or gas that was originally present, may have been driven off, as these substances are never found associated with metamorphic rocks, except in unimportant cases where the accumulation is chiefly of secondary origin.

Where May We Find Petroleum?

Many people are sometimes misled by a thin scum or film which they call oil seeps along creeks. Such a rainbow film as is seen many times of the year floating upon the water is not oil at all, but iridescent films of iron hydroxide. The two may be distinguished simply by disturbing the film, and if it is iron stain it will break up into irregular pieces, but in case of oil it will make round patches and will easily "run together" again. Many useless oil excitements have been caused by the finding of such "oil seeps."

In many places there is little or nothing at the surface to indicate the presence of valuable hydrocarbons below, but in many other fields there is ample indication of oil at the surface. The oil-bearing stratum itself may crop out and the oil ooze from it, giving to the rock a dark greasy appearance and the odor of petroleum, or the oil may find its way to the surface from the underlying pool by some fractures of the overlying strata. Sulphur charged water may rise with the oil, forming a spring, the oil floating as a thin brown scum on the surface of the water, producing beautiful colors in a thin film. Gas may find its way to the surface and form "gas springs." This is true in several places in Oklahoma.

Places where oil has come to the surface and evaporated through long periods of time may be marked by a deposit of asphaltum, which we find in the southern part of this State in millions of tons.

Oil-bearing shales have been burnt to a pink or deep brick red color in certain sections of the country. This metamorphism is caused by the burning of the hydrocarbons that have saturated the rock. Such indications may also tell the secret of a hidden petroleum body.

Rock Divisions

Petroleum and natural gas are so closely and characteristically associated with marine deposits that it seems certain they are extremely closely related. Marine sedimentary rocks are therefore of the utmost importance to the man studying oil and gas deposits. Fossils are distinguishing markers of different formations.

In sedimentary rocks we have four chief divisions, namely, gravel, which we sometimes call a conglomerate or compact rock; sand, which is also found in compact form called sandstone; silt or clay, which may be termed shale or also compact rock. Shales constitute about 80 per cent of all sedimentary rocks from the standpoint of quantity. Fourth, we have lime deposits which we call limestone, which is also a compact rock.

Shales play a very important part in oil and gas accumulations. They serve as an impervious seal in many cases and when a shale body entirely envelopes the porous reservoir the accumulation of oil or gas may become possible.

The porosity of a rock specimen is determined by the amount of water it will absorb as shown by the weight of the rock before and after saturation. This saturation may vary from 5 to 40 per cent. The most porous sands are those that are made up of grains of uniform size; thus in a sandstone whose grains are of different sizes, the smaller grains may fill the spaces between the larger ones, naturally reducing the pour space.

Speaking of the saturation of an oil sand we mean the percentage of oil present by volume in a cubic foot of oil sand. So that a sand which is 100 feet thick and which if fully saturated with oil, will produce more oil than one only 10 feet thick. The saturation of an oil sand is very important. Some sands contain as much as 20 per cent voids or open space, and if these open spaces or voids are filled with oil, each 100 cubic feet of sand would contain 20 cubic feet of oil. A bed of oil sand 100 feet thick covering an acre of ground would contain 155,535 bbls. of crude oil.

Porous beds of sandstone under heavy gas pressure give up their oil very rapidly and for this reason a thick loose bed of very porous sandrock will make a splendid container for large accumulations of petroleum.

Water conditions in an area may determine the extent of deeper pools, and if it is borne in mind that of two sands of equal porosity and equal thickness, the upper or younger one will be more thoroughly saturated with water than the lower or older stratum, therefore it may be expected that the edge of the underlying pool will not be directly under the upper one, but will extend further down the dip.

In many areas where the oil and gas reservoir is simple we find that such deposits extend farther down the long axis of the anticline or dome than on the steeper sides. In other words the area that contains water only, occurs at a higher structural position on the steeper sides of an elongated dome than it does on its plunging axis.

Migration of Oil

Capillarity has a great influence on the migration and distribution of oil, gas and water within the rocks. Water has a higher surface tension than oil and it tends to be drawn into the finest capillaries with half again as much force as oil being drawn into the same rock strata; as water has 50 per cent higher surface tension than oil, every small movement of the various fluids in the rocks will tend to move water from shale into sandstone with greater ease than the water from sandstone into shale, and likewise it tends to move gas from shale into sandstone with greater ease than moving gas from sandstone into shale, with the result that since the formation of strata, oil and gas are more readily concentrated in larger bodies in the coarse spaces of rocks or sandstone layers, in shale, in conglomerate layers or other coarse layers, leaving the water within the shale. Water is continually forcing the oil ahead into the highest possible level for the reason mentoned, and due to the difference of specific gravity of the two liquids.

Only a portion of the actual amount of oil in a sand is obtained with the present producing methods. All the oil is not recovered because the movement of the oil from the pores of the sand into the well is caused by pressure of the gas with the oil, and when the pressure has declined the flow of the oil is stopped and the well production becomes so small as to be of no future profitable use. So it will be seen that although a well may be abandoned as no longer of commercial value, still there may be a great amount of oil in the sand that has not been recovered. The question of porosity is becoming more important as the known fields are depleted, and further recovery of oil is made possible by flooding the sand or by artificial restoration of the lost "rock pressure," in order that recovery may be increased.

Where Folds Effect Accumulations

Where sharp foldings occur there in a great pressure present and if there were any oil present in the shale at the time the folding took place it was perhaps forced out into the sandstone in an upper or lower layer. If such a condition existed little or no oil would be found in the shale, at the top or bottom of such folding, but the oil would have migrated into the more porous beds of sandstone as sand and sandstone are much more porous than shales and therefore make better petroleum traps. If the beds at the top of the folds are not porous little or no accumulation will take place.

The position of an oil accumulation appears to depend primarily on the shape and position of the containing porous rock or reservoir. In some cases, especially if the reservoir is lenticular in shape, commercial important deposits are found in the strata which are essentially horizontal or inclined in one direction, however, and most commonly larger quantities of oil are found where the containing rock has been arched in such a manner that one portion is higher than the other part. Such arches are called structures, anticlines, domes, terraces, which are most favorable for large accumulations of oil, and it is the work of the

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geologist to find out the true extent and position of such rock outcroppings.

Instruments Used in the Field

The general method of determining the elevations on a structure, where there are one or more key-horizons at many points is by use of the alidade, plane-table and rod. The plane-table is used to do the field mapping on and is leveled each time the table is moved from place to place. The alidade rests perfectly level on the table and is used to sight the geologist's rod at points where he desires readings taken. The alidade telescope is very much the same as the telescope of an ordinary surveying instrument, so far as the magnifying glasses in the telescope are concerned. The success of such work depends upon the exposures available, and their proper identification.

By a key-horizon is meant any stratum of rock that may be followed from place to place, or from outcrop to outcrop. If such outcrops are not continuous but are some distance apart, they may be identified by some characteristic peculiar to such rock. Fossils offer the best and surest means of recognizing horizons, and therefore thin fossiliferous limestones make the very best key-horizons to follow.

The plane-table is the most important instrument for the geologist and is most frequently used in all kinds of geological work; both the results obtained and the time and expense connected with it are its main features. The greatest point in its favor is that outcrops and their elevations as well as all topographic details may be obtained and mapped right in the field, so that the actual construction of the map in the field may show errors, which may be eliminated. Such errors, if obtained only in the office when the field notes are worked up, would necessitate an extra trip back in the field and perhaps the changing of certain parts of the map which may have been well under construction at the time these errors were detected.

As has been stated before, domes are considered the best places to prospect for oil or gas; a dome may be described as where the strata dips away in all directions from a center point. The oil accumulations in domes are more perfect and the pressure will case a longer natural flow of a well.

A level axis anticline is perhaps the next best place to drill for oil. Such an anticline is more frequently found than the domes and also have proved to be of great value as accumulators for large deposits of oil and gas in commercial quantities.

When an anticline axis itself dips in one direction, the anticline is known as a plunging one; a nose is generally a plunging anticline along the flank or side of the main anticline and a terrace is the sudden flattening of the top for a short distance. Plunging anticlines are sometimes very misleading as the plunging part might bring the most favorable portion of the structure to a point where the reservoir rock has been exposed or eroded away.

From the lessons of experience, and realizing the vast fortunes that have been wasted in a blind search for oil and gas, we are forced to but one conclusion with respect to these past wildcat adventures, and as time goes on, and as the oil man becomes better acquainted with geological methods, no man or set of men will attempt to finance a prospecting scheme in the future, until all features governing the oil possibilities of the area have been thoroughly gone over and passed upon by a competent geologist who has studied the conditions carefully.

It is by far the cheapest, the surest and the safest method of prospecting for oil or gas and will tend to "cut down" the staggering figure which has been spent in the past on random drilling in wildcat places without regard to the true geological conditions. The prospector who is not led by signs or science, but who goes out and "sticks 'er down" has, therefore, about one chance in a thousand of striking oil. For mine, I'll take the oil geology.

ROCKY MOUNTAIN AREA

(Continued from Page 45)

3,613 feet. This is the 8¼-inch pipe and drilling will be resumed next week.

Colorado Inactive

Colorado is showing very little activity at present. The only new development that is interesting the oil fraternity is The Texas Co.'s well in Routt County, which is producing from the Frontier shales. Both Moffat and Fort Collins are quiet.

La Barge Wells

The Midwest well in the La Barge Field, in Lincoln County, in the southwest corner of Wyoming, is drilling at 2,360 feet in shale. The oil showing found at 1,920 feet was passed up as not of commercial size and the well is to be put down to the Frontier sands expected around 3,000 feet. In the same field, the Transcontinental Oil Co. is rig building for a test and the Wyotah Oil & Gas Co. is drilling with a diamond drill on Section 34-27-113.

The Sheldon Dome well of the Mack Oil Co., about 50 miles north of Riverton in Fremont County, is showing oil. It had a showing of gas estimated at 4,000,000 feet and during the past few days oil has appeared and the well is now estimated at 25 bbls. The crude is a light oil about 34 gravity.

The Texas Co.'s refinery at Casper has received the first shipment of crude from the Routt County wildcat of the Texas Production Co., drilling on Section 7-6-86, which found oil in the shale at 2,360 feet on what is known as the Tow Creek Dome. This well has stopped drilling operations for the time being to produce the shale oil and the shipments are being sent into Wyoming from Colorado for refining at Casper. The well is producing about 300 bbls.

Salt Creek Deep Sands

The deep sands at Salt Creek are quiet, the Lakota well of the Midwest on Section 23-40-79 is still being mudded off so that drilling can be resumed. The gas and oil come from the upper Lakota stratum and another sand is expected within 60 feet. Below the Lakota are six other sands that may or may not hold oil; these have never been tested to date. The Lakota well of the Kinney Coastal looks like a dry hole and from this and other wells drilled, the Lakota area appears to lie much like the first Wall Creek sand area. This means that the Midwest Refining Co. controls all of the Lakota area and that there will be no need of a heavy drilling campaign or any line fighting, but that the Lakota Pool will be drilled and drawn upon as the country needs the oil. In this way, the new pool will be held in a conservative way for the best interests of the public.

In the case of William S. Barnickel versus the Producers & Refiners Corporation, which the Federal Court at Cheyenne, decided in favor of Barnickel, the Producers & Refiners has asked for a stay of execution and given notice of appeal to the Court of Appeals, which was granted.

The oil shale industry is to show some activity in Wyoming this season according to advices from Green River, county seat of Sweetwater County, in southwestern Wyoming. A large shale extraction plant is to be placed in operation there by Chicago capital represented by J. E. Hime. This plant will be built west of the city of Green River in an area of extensive shale beds that contain oil and the plant is to operate under what is termed the Trumble process.

Montana Operations

In Montana, the Absaroka Oil & Development Co. is planning to start drilling after the winter's shutdown, on the wildcat in the Woman's Pocket Dome, Section 28-5-21, in Golden Valley County. This test was drilled to 1,650 feet last year and shut down for the winter.

Another rig is moving into the McDonald Dome southwest of the Cat Creek Field where a shallow well was found about 900 feet deep. The first well is still trying to shut off water.

The gas strike at Sunburst, about 8 miles north of Shelby, is considered the

(Continued on Page 192)

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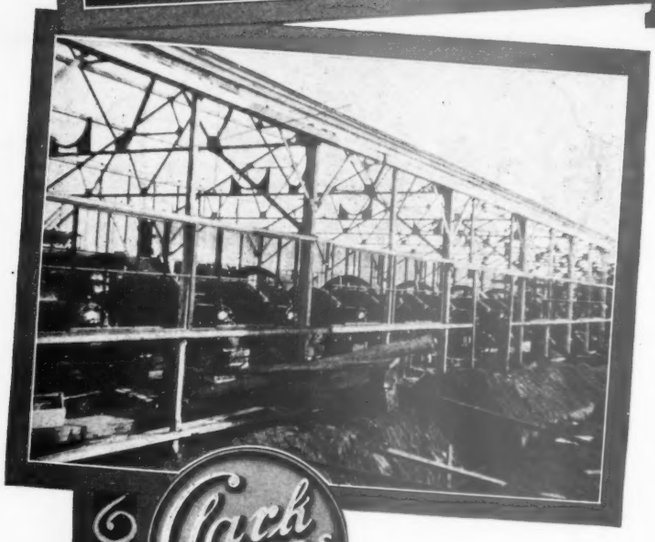

3300 H.P. OF CLARK

The new Papoose Field Gasoline Plant of the Phillips Petroleum Company will be one of the largest gasoline plants in the world from the standpoint of volume of gas handled daily. This plant is located about 7 miles west of Wetumka, Oklahoma. When completed it will produce somewhere between 30 and 40 thousand gallons of gasoline per day.

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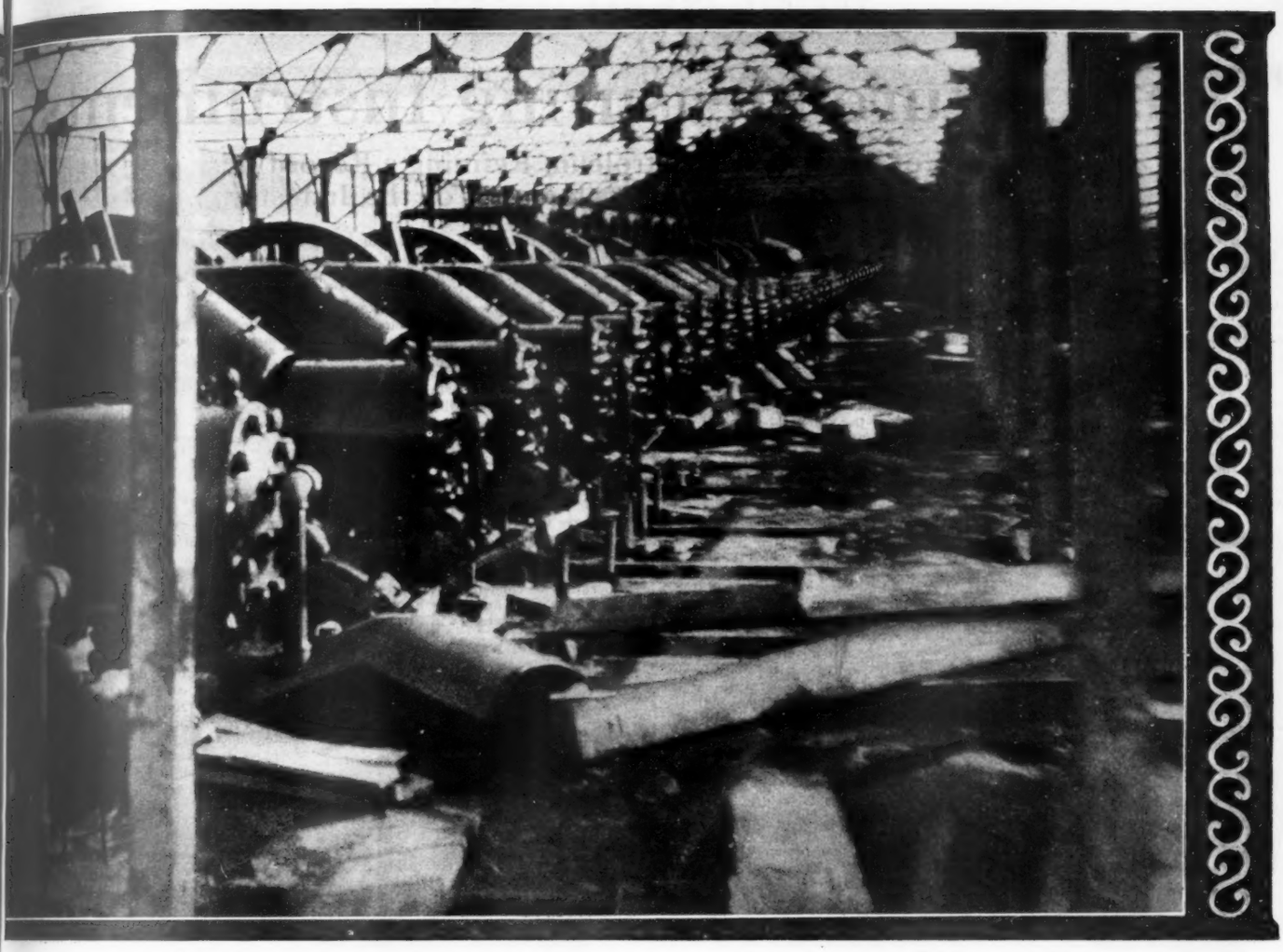

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Its entire compressor equipment will consist of CLARK 165 H. P. Twins.

The Phillips Petroleum Company is not experimenting, as they had more than 2,700 Horse Power in CLARK Compressors in operation in other of their Texas and Oklahoma plants before ordering equipment for the Papoose Field installation.

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PRESSORS

Temperature Measuring Instruments

Evolution of Their Use in Petroleum Refining a Record of Continuing Progress in the Development of the Industry

If King Petroleum had begun his visits to Tulsa some years ago it would have been interesting to compare his diary of that day with his log of today. Especially would this be true if one is interested in the evolution of temperature measuring instruments in the oil industry.

The recording thermometer was one of the first instruments to be brought into the refinery field. This was not a new instrument, it was simply borrowed from other industries.

The recording thermometer is made up of three types. It consists of a hollow enclosed tube known as a bulb, a spiral helix assembly, the movement of which deflects a pen, and a small capillary tubing which connects the bulb with the small helix assembly. The bulb, tubing and helix are filled with a gas (usually nitrogen), a liquid, or a combination of liquid and vapor, depending upon the service for which they are to be used. The volume of the bulb must be much greater than the combined volume of the capillary tubing and helix in order that the temperature variations along the capillary tubing and helix may be negligible. It is expansion or contraction of one of the above mediums which fills the bulb, tubing and helix, that causes an increase or decrease in the internal pressure. This internal pressure is transmitted to the helix which causes a deflection of the pen proportionate to rising or fall of the temperature.

No. 1—Precision portable Potentiometer used as a checking instrument for other temperature measuring instruments.

Recording Thermometers

Since the entrance of the recording thermometers into the oil industry little change has been made in their operation or application. A great deal has been done to make the instrument more rugged and improve its mechanical design. The instrument of today as manufactured by the leading companies is an excellent piece of workmanship. Extreme care has been taken to make the case as fume and dust proof as possible, to eliminate all joints and thin sheet metal in the case which are subject to corrosion, and to make the bulb assembly sufficiently robust to stand the abuse incident to refinery practice. Today, as when the recording thermometer was first brought to use in the refinery, the capillary tubing is the vital point. If this tubing is broken or cracked the internal pressure is relieved which makes the instrument useless. It must then be returned to the factory for refilling and recalibration.

The recording thermometer filled the need of that day for it offered a protection to the operating superintendent. The gas filled type proved itself to be more sensitive and more accurate than the liquid filled (usually mercury—or, for low temperature, a compound of alcohol). Thermometers having a combination of liquid and vapor were more sensitive, more rugged and more accurate than either of the other two. The reason for this is that in this instrument the internal pressure is not required to be so high. One fact has stood out—the capillary tubing is the vulnerable point in any thermometer and comparatively easily broken.

Uses of Pyrometers

As the recording thermometer had been borrowed from other industries, the pyrometer was soon to make a like transition. A pyrometer is an electrical instrument which measures the current produced by two wires of dissimilar metals, welded together and immersed in the temperature. The current produced by those dissimilar wires is proportionate to the difference in temperatures between their hot and cold ends. If the cold ends of these dissimilar wires can be arbitrarily maintained at a known temperature or its variations completely compensated, the instrument can be made to read directly in degrees temperature. This is what is attempted in pyrometers. It is practically impossible to maintain arbitrarily the temperature of these dissimilar wires at a given point. Therefore compensation is attempted. The problem of complete compensation is not an easy one. To date there are probably only two manufacturers who have completely compensated for these variations.

Pyrometer's Advantages

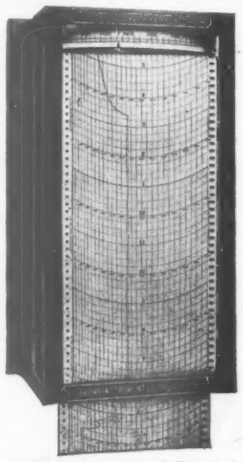
The pyrometer has the advantage over the recording thermometer:

1. It is a great deal more accurate.
2. It is decidedly more sensitive (for the reason that the recording thermometer must have a bulb of not less than ¾-inch diameter by 10 inches long or equivalent volume which has a definite mass. Any temperature fluctuation must affect this mass before the recording thermometer can function. On the other hand, the pyrometer has only the very tips of two very fine wires, if need be, to change in temperature. It is obvious that the pyrometer can detect changes large or small more quickly than the recording thermometer because of the decidedly small mass which must undergo temperature change to cause the instrument to function.
3. The instrument can be more remotely located to the temperature to be measured.
4. It is more flexible. Its range, calibration, or repair can usually be done in the field—which is impossible in the case of a thermometer. If accident should cause the leads to be severed it is merely a matter of splicing the wires; in the case of a thermometer, if the tubing is broken the instrument must go back to the factory.

With the development of the pressure still through a demand for a more sensitive, more accurate, more dependable and more flexible instrument, the electric pyrometer came into its own. Not only have pyrometers been installed on practically every pressure still, but they are fast replacing the recording thermometer on the crude still application because of their greater accuracy, sensitiveness and flexibility.

Differing Applications

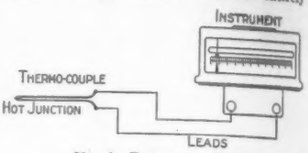
There will always be certain application where the demand for accuracy and flexibility is not so strenuous, where the risk of injury is not so great for recording thermometers. For measuring the temperature of condenser box water, feed water to boiler, and like applications, recording thermometers will always have a use. Recording thermometers are widely used in gasoline plants. For this application pyrometers are not applicable; however the future may see the resistance (electric) thermometer developed for this application.



No. 3—Recording control Pyrometer.

In refinery application it is usually found better practice to connect a pyrometer directly to every thermocouple without the use of any switch—hand or automatic. The use of a multiple (wherein one instrument is made to record any number of temperatures by switching from one thermocouple to another) has not found consistent favor in refinery circles. The reason for this is that any automatic switch for a thermoelectric circuit as yet designed will require undue attention to prevent corrosion and contact resistance.

Pyrometers, as were thermometers, were borrowed from other industries and with very little change in their design were applied in oil refinery applications. These first pyrometers were not entirely suitable for the new applications.



No. 4—Pyrometer circuit.

Remarkable Progress

To date the manufacturers have done much to redesign their product to meet the demands of an accurate, accessible, fully protected and practically foolproof instrument. In a catalog of one prominent pyrometer manufacturer (just now being distributed) the first four pages give an illustrated description of how great and how complete an organization is behind the pyrometer of today; for instance, an independent research department and model shop was unknown in the pyrometer factory of a few years ago. The pyrometer of today in the oil industry has shown more progress and is more satisfactory than in practically any other industry. Today the pyrometer is made to indicate not only the oil temperature of the stills, the vapors leaving the tower for the condenser, which tell the operator whether his product will be up to specification, but also the furnace and stack temperatures, the record of which tells the operator and superintendent whether it was done economically.

The usual installation includes a recording pyrometer on the oil temperatures, a recording pyrometer on the furnace, a recording pyrometer on the vapors leaving the towers to condenser. Oftentimes recording pyrometers on these points are supplemented by additional recording pyrometers on other intermediate points. In other cases, an indicating pyrometer gives the temperatures of the other intermediate desired points. Figures 1, 2, 3 and 4 give typical charts and illustrations of pyrometer installations.

Conserving Profits

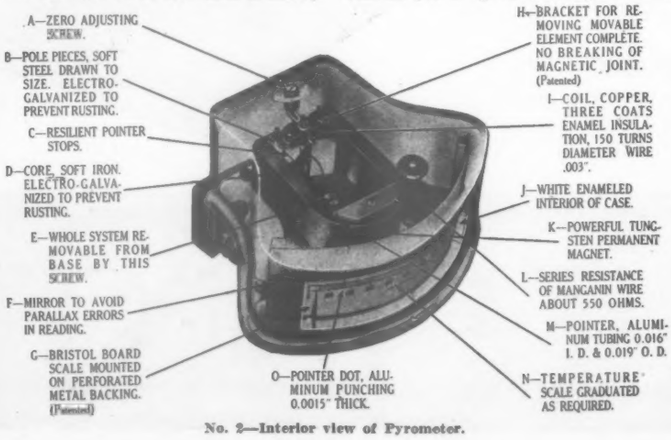
Where before the refiner had been mainly interested in maintaining the desired product, recording thermometers had been of individual help to him. However, comparatively speaking, he was merely taking the cream off as his product; he was not particularly interested as to how much it was costing him to get his product or as to whether his costs mounted with his yields.

Now with the margin of profit decreased, the refiner must look more closely at the cost of refining his product. In the ordinary batch or continuous still, little could be done to help inefficient combustion if it existed and it usually did exist. With the development of the pressure still more attention was paid to the design of the furnace and correction of the combustion inefficiency was a greater possibility. As the first assistance to the refiner the pyrometer gave him his stack temperature which indicated the heat loss going up the stack. The state of combustion in the average still is probably more inefficient than 90 per cent of the power plants throughout the country.

Electric CO_2 Recorder

Attention to the CO_2 condition in a still furnace has been heretofore hardly practical due to the lack of development in CO_2 instruments. There is today a CO_2 recorder working on the principle of

(Continued on Page 192)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L—SERIES RESISTANCE OF MANGANIN WIRE ABOUT 550 OHMS.
M—POINTER, ALUMINUM TUBING 0.016" I. D. & 0.019" O. D.
N—TEMPERATURE SCALE GRADUATED AS REQUIRED.
O—POINTER DOT, ALUMINUM PUNCHING 0.0015" THICK.

No. 2—Interior view of Pyrometer.

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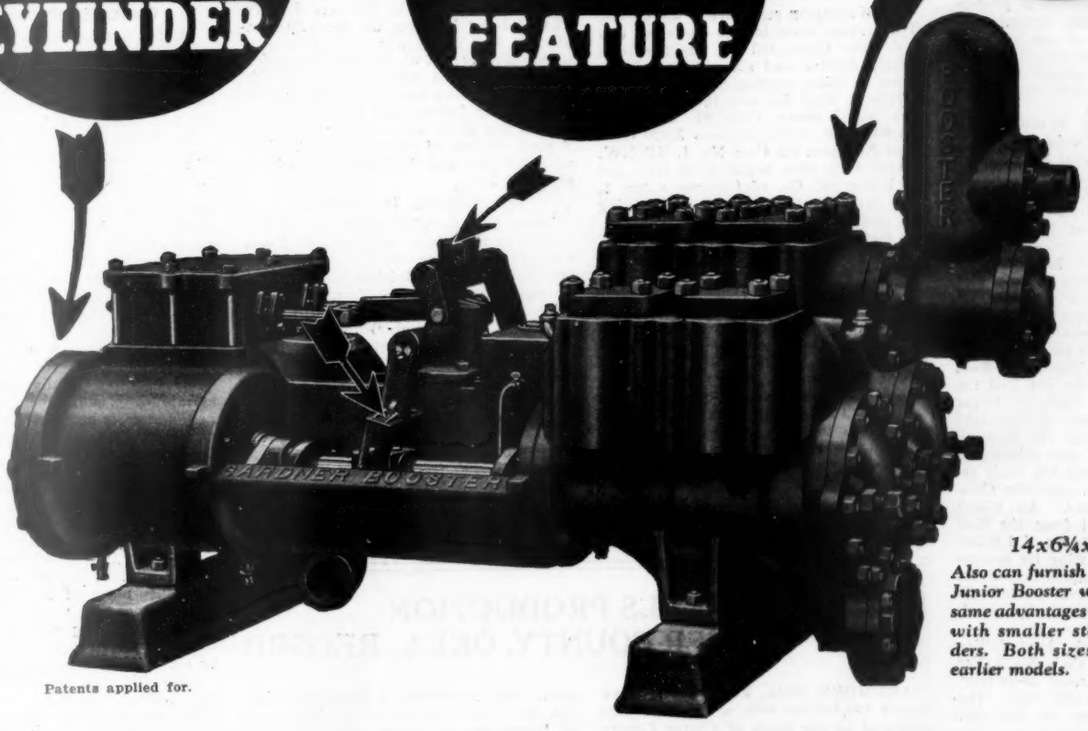

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N. E. Colorado Will Get the Big Play

The Fort Collins-Wellington Area Gives the Most Promise for Productive Operations in the State

Special Correspondence

FORT COLLINS, Colo., Feb. 21.—With the coming of spring the Fort Collins district, the most promising area for oil operations in the State of Colorado, will receive a more thorough exploration than it has ever been given. The Union Oil Co. of California, which holds the largest acreage in the district is preparing for a large wildcatting campaign as well as the development of the locations believed to be surely productive. It is reported that its program includes six wells on the Fort Collins structure and two on the Wellington structure.

The Fort Collins Field, 70 miles north of Denver and 5 miles northeast of Fort Collins, was opened August 7, 1924, by the Union Oil Co. of California in its No. 1 Whittaker in Dakota sand found at 4,472 feet. The well started to flow when the bit was 3 feet in the sand making nearly 800 bbls. a day of 38 gravity crude. This well has produced over 112,000 bbls. to date and is still good for 725 bbls. a day. A contract was made with the Midwest Refining Co. for the sale of the oil produced by the Union Oil Co. in this field to a maximum of 6,000 bbls. a day. The price fixed was $1.35 per barrel at the well and the contract runs to July 1, 1925. A 40-car loading rack was completed on the night of November 3, 1924 and the first oil from the Whittaker well was shipped on November 4 to the Mutual Oil Co.'s refinery at Florence, Colo., over the Colorado & Southern railroad. An 8-inch pipe line conveys the oil from the field to the loading rack, a distance of 4 miles. The Union Oil Co., following its success on the Whittaker land, started four wells, and stock companies have started six tests and have two additional rigs standing.

The next well due in the Fort Collins district is the Union Oil Co.'s No. 1 Ver Stratton, C SW SW, Section 19-8n-68w, which is drilling at 4,250 feet. The Dakota sand is expected in this test around 4,505 feet.

The Wellington Structure

The Wellington structure is in Townships 9 and 10 north and Ranges 68 and 69 west, 15 miles northeast of Fort Collins. The Union Oil Co.'s famous big gasser was drilled on the Wellington Dome, NW SW NW, Section 31-10n-68w. The top of the Dakota sand was found at 4,285 feet and the well blew in with a flow of 80,000,000 feet of gas which was finally put under control. This well showed considerable oil. There is a difference of opinion among operators as to the source of the oil, some believing yet that it comes from shale pockets, but the predominant thought being that it is from the Dakota sand. The Wellington structure in the opinion of many oil men will show some large oil producers. On top of the structure large gas wells are expected while oil wells are looked for on the flanks of the structure. The Union Oil Co. has the best and the largest acreage in this district as in the Fort Collins area. The Marland Oil Co. owns considerable acreage and the Carter Oil Co. has several leaseholds. On the outside stock promotion companies have gathered up a batch of leases. The gas from the big well has been used to supply fuel for nine drilling wells in the Fort Collins area. It produces about 70 bbls. of oil daily along with the gas. The crude is placed in storage. Following the completion of the big gasser two wells were started on what was believed to be the southern edge of the structure to determine its limits and the Fort Collins test and that on the Douglas Lake Dome were begun. The second well to show was the Union Oil Co.'s No. 1 Mitchell, CEL SW NE, Section 6-9n-68w, which was an 80,000,000-foot gasser from Dakota sand at 4,216 feet. The well caught fire July 19, 1924, and the fire was not extinguished until August 18. Following this the well was shut in, awaiting results in other wells.

Considerable Activity

The Wellington structure is the busiest oil operating area in the State at this time. The Union Oil Co. has five tests actively drilling and six wells are being drilled by other companies. The deepest operations thus far are the Union Oil Co.'s No. 1 Scott, CSL SE SW, Section 6-9n-68w, which is below 3,320 feet; Great Northern Oil Co.'s No. 1, NE NW, Section 19-9n-68w, below 3,940 feet, and the Union Oil Co. of Colorado's No. 1, SW NE, Section 8-9n-68w, waiting for casing, well depth at 4,420 feet. The last named test is supposed to be off structure and the Dakota sand is expected at 5,000 feet or thereabouts.

The Douglas Lake Dome test is shut down at 4,334 feet. The Union Oil Co. is drilling in the NW cor. Section 36-9n-69w, Larimer County. Dakota sand was found at 4,256-72 feet but it contained only water. The test was continued with the Lakota sand as the objective. The present depth is 4,336 feet. Other tests in this area are awaiting results in the Union company's operation.

There are no other structures in Colorado as large as those in the Fort Collins district and the State has been well geologized. It is natural to expect that the main hope of making Colorado a producing State of importance lies in this northeastern area.

The abandonment of the Haystack and the Berthoud structures centers the northeastern Colorado developments in the Fort Collins area. The Haystack structure is in Boulder County and the Berthoud structure in Larimer County. The Midwest Refining Co. recently completed a deep dry hole in the Lakota sand in the SW cor. NW, Section 16-4n-69w. The Dakota sand was found at 3,925-36 feet and carried a hole full of hot sulphur water. The Lakota was found at 4,020-31 feet and more water was encountered. A good showing of oil was found in shale at 3,137 feet and 5,000,000 feet of gas at 2,955 feet.

Yuma County Is Promising

There is a promising area in what is known as the Wray Gas Field in Yuma County. Three gas wells of about 2,000,000 feet each were finished in sand lying at approximately 1,600 feet. No deep tests have ever been completed in this area but the Mutual Oil Co. is below 1,500 feet in a test in the NW cor. Section 28-2s-43w.

Another northeastern deep test is that of the California Co. (Standard Oil Co. of California), CEL SW SW, Section 19-16s-48w, Kit Carson district, Cheyenne County. The Dakota sand was found at 1,490 feet and contained water and the test is being carried on down to the Pennsylvania beds. At last report the hole was 2,570 feet in depth.

El Paso County east of Colorado Springs is due for some work next summer. The Roland Oil Co. is drilling a well in the SW cor. SE, Section 9-12s-62w, which is below 2,000 feet. The Gypsy Oil Co., the Roland Oil Co. and other companies have blocks leased in El Paso County.

Dakota Sand's Importance

All the production in Colorado up to the present comes from the Dakota sand. The Lakota, which underlies the Dakota, gives much promise of production. No other sands thus far found give promise of oil in commercial quantity.

Production comes from minor folds or anticlines on the borders of the closed basins more or less surrounded by mountain uplifts. It is beginning to be more appreciated that oil is more likely to accumulate in folds occurring around the edges of close basins. The reason, while not clear, has to do with the circulation of ground water through the beds.

While the Pennsylvania Beds lie at some depth below the Dakota sands and much exploration has been done in Colorado in an effort to find production in them, it must be said that the Pennsylvania region is totally unlike the Pennsylvania beds of Oklahoma and Texas and in Colorado is notably lacking in the elements which are considered as being the necessary source for oil.

Northwestern Colorado, south of the Uinta Mountains and west of the Rockies contains an area divided into several minor basins in which the Dakota sands are buried to a sufficient depth to make the district look promising.

The area is dotted with domes and anticlines many of them now being subject to test and more of which will be tested the coming summer. The following tests in this part of Colorado may be classed as future prospects for oil.

Ohio Oil Co., NE NW SW, Section 13-12n-89w, temporarily shut down at 2,330 feet on Snake River Dome, Moffat County. This is to be a test of the Marpas sand.

New York interests will test the Hiawatha Dome, Township 12n-101w, Moffat County, next summer, but not for the Dakota sands.

Marland Oil Co. is below 1,975 feet, NE cor. SW, Section 20-1n-93w, Meeker Dome, Rio Blanco County. Dakota sand outcrops on this structure and this test will be of the Pennsylvania formations.

The Marland Oil Co. is underreaming at 1,746 feet on the Thornburg structure, SE cor. NE, Section 16-3n-91w, Moffat County.

The Union Oil Co. is shut down until spring at 3,335 feet on the Elk Springs structure, NW cor NE NE, Section 31-5n-98w. Five million fee of gas was found at 2,905 feet and was mudded off.

The Carter Oil Co. is below 2,830 feet in the SE cor. SW NW, Section 8-4n-87w, Routt County, Sage Creek structure.

Texas Production Co. is drilling below showing of oil in shale at 2,565 feet, 2,500 feet in the SE cor. Section 7-6n-86w, Routt County, Tow Creek structure. About 5,000,000 feet of gas found in the top of the Niobara at 1,910 feet. This will be a Dakota sand test.

The Sun Oil Co. has a test on the Carmesa structure which lies in townships 7 and 8, Ranges 102 and 103 west Garfield and Mesas counties. The test is in the NW NE NW, Section 8-8s-102w Garfield County. Fifty-two million feet of gas was found at 2,865 feet. The Dakota sand is expected at about 3,500 feet.

The White River Development Co. is shut down temporarily at 2,746 feet in the NE NE NW, Section 31-2s-90w,

(Continued on Page 154)

194,442,666 BARRELS PRODUCTION CARTER COUNTY, OKLA., RECORD

ARDMORE, Okla., Feb. 20.—Approximately 194,442,666 bbls. of crude oil were produced in the fields of Carter County from the date of discovery of petroleum within its bounds in August, 1913, to the end of December, 1924, covering a period of about 11½ years, writes William Krohn in the Daily Ardmoreite. The production includes yield from six districts, the ages of which vary from slihtly more than one year to the period mentioned. Of the total amound recorded, the Healdton Pool, discovered in August, 1913, produced 131,725,851 bbls.; the Fox Field, brought in in October, 1918, made 6,237,440 bbls.; the Hewitt Pool, discovered in June, 1919, produced 48,363,372 bbls.; the Brock Field, opened in January, 1921, made 911,510 bbls.; the Graham Pool, recognized as a separate district in March, 1922, produced 6,975,926 bbls., and the Sholom Alechem Field, opened in October, 1923, made 228,567 bbls.

Healdton, the "daddy" of them all, is far ahead as compared with the five other fields, and has a lead which will probably never be surpassed in this county. In this connection, it is interesting to note that during December, 1924, the Healdton Field was averaging 16,092 bbls. daily, only 371 bbls. behind Hewitt, which was leading the fields of the county. At the rate Hewitt was dropping and the consistency of the Healdton output, it is expected that during the present year, Healdton will again become the leader of the fields of the county in daily production, a remarkable achievement, and yet not surprising, for it has long been conceded that the Healdton Pool is the greatest oil producing area in the world relative to production per acre, considering its age.

From the date of its discovery in August, 1913, to the end of December, 1924, the Healdton Field produced an average of approximately 18,738 bbls. per acre. Its proven territory covery an area of approximately 7,030 acres, and its production amounted to 131,725,851 bbls.

The Hewitt Field produced approximately 17,523 bbls. per acre from the date of its discovery in June, 1919, to the end of December, 1924. Its proven area comprises approximately 2,760 acres, and it produced 48,363,372 bbls.

The Fox Field produced approximately 5,198 bbls. per acre from the date of its recognition as an oil field in October, 1918, to the end of December, 1924. Its proven area comprises approximately 1,200 acres and it produced 6,237,440 bbls.

The Brock Field produced approximately 2,604 bbls. per acre from the date of its discovery in January, 1921, to the end of December, 1924. Its proven area comprises approximately 350 acres and it produced 911,510 bbls.

The Graham Field from the date of its discovery in March, 1922, to the end of December, 1924, produced approximately 3,370 bbls. per acre. Its proven area comprises approximately 2,070 acres and it produced 6,975,926 bbls.

The puzzling nature of the Sholom Alechem Field, which, at the end of December, 1924, was still in an indefinite status relative to trend of production and other factors necessary in determining or estimating its proven area, maes it practically impossible to give with any degree of accuracy its production per acre to date. From the date of its discovery in October, 1923, to the end of December, 1924, it produced a total of 228,567 bbls.

At the end of December, 1924, there were 3,090 oil wells producing in Carter County.

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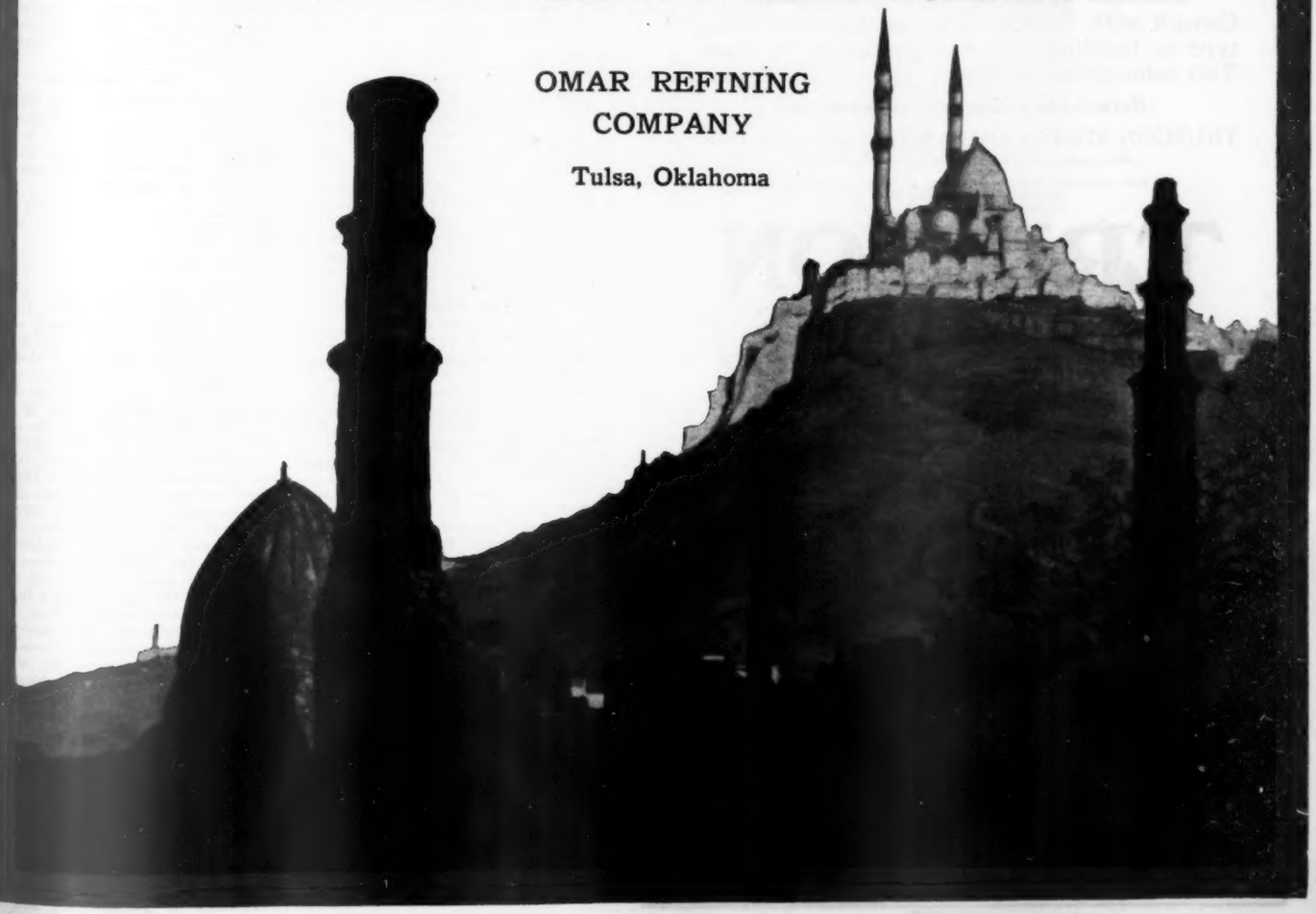

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MEXICAN PRODUCTION DURING 1924 SHOWS 12,697,965 BARRELS DECLINE

By George Blardone

TAMPICO, Mexico, Feb. 21.—The production of petroleum in Mexico in 1924 can be placed at 139,071,883 bbls. This is a decrease compared with the production of 1923 of 12,697,965 bbls. A brief recapitulation of the production by general fields in 1924 will show the following: Northern fields, 100,435,232 bbls.; southern fields, 38,587,151; Isthmus of Tehuantepec (south Mexico), 49,500 bbls.

The distribution of 1924's production can be placed as follows: There was some 2,344,970 bbls. of crude imported from the United States (principally from California), to balance one company's crude accounts. There was withdrawn from storage during the year some 2,231,191 bbls., which, added to Mexico's production for the year, gives a total of 143,648,044 bbls. Wherefore, visible exports for the year sum 128,836,564 bbls.; domestic consumption (including certain coastwise figures explained later), account for 14,811,480 bbls. This balances the two sets of figures.

Production by Fields

In the production by fields for 1924 history rather upends itself. For the first time in a long while, the losses in production, as contemplated year by year, is aimed at the south fields. Thus this light gravity producing section of the Republic fell behind this past year, producing but 38,587,151 bbls., a loss from its production in 1923 of 24,839,808 bbls. Half of this loss was counterbalanced in the northern fields, (heavy gravity sector), where, thanks to the productivity of the Cacalilao sector, and even of Ebano, now occupying the calcium glow, production outstripped all previous records, going to a total of some 100,435,232 bbls., an increase over the production in 1923 for this district of say, 12,092,343 bbls. Thus the north field (the heavy oil district) cuts Mexico's loss in production, 1923 considered, from say 24,000,000 bbls. to 12,000,000 bbls.

Storage Oil 1925

As the year closed the oil in storage in Mexico, original hands, can be placed as follows: Heavy crude, 6,500,204; light crude, 2,628,616; topped crude, 9,052,676; refined oils (distillates, etc.), 1,991,752. This gives a total as of record January 1, 1925, of 20,173,248 bbls. The decrease from storage in the same date of 1924 is 2,231,191 bbls., which is duly credited in the opening paragraphs of this article as being subject to distribution, i.e. "withdrawn from storage."

Domestic Consumption

One of the best indices as to Mexico's rehabilitation is given by the increase in domestic consumption. This is largely reflected by the use of fuel oil (it is impossible to get any checks on case or barrel goods used or imported), as it goes by tank lots. Thus the fuel oil consumption, from the Tampico district alone, as reflected by tank car shipments, totaled 7,058,322 bbls., and when refined oils, by tank car, for interior points, from this district, is added, we have a total for the year of 7,723,880 bbls., an increase over the movement from this district in 1923 or 988,517 bbls. There is, naturally, much more domestic distribution reflected in vessel shipments, coastwise, as is pointed out in that part of this article. Suffice it that the increase in domestic consumption is healthy and bodes well for the economic future of the country.

Vessel Shipments

The movement of petroleum from Mexican ports of primary clearance during 1924 totaled 132,793,390 bbls., a decrease when compared with a similar movement in 1923 of 7,998,914 bbls. Reduced to a table, by ports, the following is obtained:

From—	Barrels
Tampico	123,037,300
Port Lobos	4,307,361
Tuxpam	5,448,729
Total, 1924	132,793,390
Total, 1923	140,792,304
Decrease, 1924	7,998,914

This movement was distributed as follows:

To—	Barrels
*United States	89,183,398
United Kingdom	8,373,244
Cuba and West Indies	7,610,670
South America	6,791,451
Continent	5,425,980
Mexican Coastwise	3,956,826
Canada	1,784,498
Panama	1,130,557
Central America	811,755
Azores	620,786
Mediterranean ports	298,531
Bunkers (to balance)	6,895,675
Total	132,793,390

*Includes insular possessions.

By classes these oils were as follows:

Crudes	79,311,316
Topped crudes	41,826,529
Distillates	4,759,870
Bunkers (to balance)	6,895,675
Total	132,793,390

The total vessel movement as outlined above does not mean the total volume of oil actually exported. Mark the fact there was dispatched by sea to coastwise Mexican ports a total of 3,956,826 bbls. Just how much of this oil eventually went export from Puerto Mexico, where Mexican Eagle Oil Co. has a refinery (Minititlan), it is not possible to say at this writing. A rough average, however, would place 50 per cent of this coastwise movement as being destined eventually for export delivery, the remainder entering the domestic consumption column. This would mean possible exports of 130,814,977 bbls., although the actual visible exports from ports of primary clearance is as stated in the tables in the introductory paragraphs of this article.

In the movement of vessel shipments during the year some 84,632,870 bbls. of the heavy crudes of the northern fields are included. Actually it is possible that a little more heavy oil is in this vessel movement, but if so it is in the prepared fuel columns so mixed with light crude that it is not possible to separate it or know its volume. However, such a volume would be small and of little more than academic importance.

Well Completions

The wells completed during 1924 easily broke all previous completion records as a comparison with the previous high year, 1923, in the subjoined table, will show. The completion record for the yast year is indicated as follows:

Fields—	Comp.	Prod.
Northern fields	638	214
Southern fields	90	43
South Mexico	4	2
Total, 1924	732	259
Total, 1923	471	217
Increase, 1924	261	42

In the preliminary review for 1924, already published I discussed at some length the field activities of the past year, hence at this writing there is hardly anything to add. I might repeat, however, the fact I stressed then that the percentage of the wells finishing in the pay during 1923, especially in the northern fields, where the greatest activity was manifested, was much higher than was the percentage so finishing in 1924. Further, the large number of wells drilled in the Cacalilao sector during 1924 (especially in Lot 1, where drilling locations were easily had by any contractor with the tools and ability to put down a hole), resulted in many failures; and in wells finishing in the pay showing a disposition to go to water quickly. Thus the production curve in this much exploited sector, despite numerous completions, showed a constant tendency to fall, especially following the months of March-April when production in the northern fields, thanks to this Cacalilao section, reached its peak.

South Mexico

In the table given aoove south Mexico comes into view again with four completions during the year. This is the Isthmus of Tehuantepec and the State of Chiapas, etc., where Mexican Eagle Oil Co. long ago sought the elusive pay with unsatisfactory results, although the salt dome country of southern Vera Cruz (Isthmus of Tehuantepec) held much promise at first. Last year Mexican

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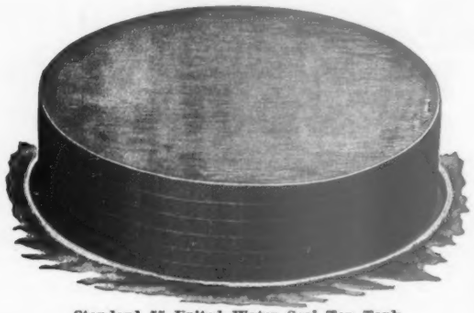

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Eagle finished its No. 10 Filisola there at 2,815 feet. It had a big blowout at first, but it does around 200 bbls. of high gravity oil now. Mexican Seaboard's subsidiary in this south country has three of its San Carlos wells finished, de facto possibly if not de jure. Its No. 1 which stopped in rock salt at 2,332 feet, makes some little oil which is used for fuel. Its No. 2 finished in the same formation at 2,271 feet, and No. 4 is 2,165 feet, finishing in plain salt. The Mexican Seaboard subsidiary is drilling now on its Nos. 3 and 6 San Carlos.

Mexican Eagle Oil Co. has five strings of tools running at Filisola at the present writing, and one at Sarlat, in the State of Tabasco.

The above sums all the operations in south Mexico and the results last year, that I can get any accurate data on.

To sum up, leaving aside the matters of field explorations, already commented on at length in the preliminary review, 1924 saw, as reflected by a falling south fields production curve, some four loading terminals in the jurisdiction of Port Lobos closed down. They were: The Texas Co., which not only closed its loading station there but its topping plant also. The Agwi companies (Atlantic Gulf Oil Corp.) closed its loading station: the Transcontinental Petroleum Co. did the same, although it continues to load some little south fields crude from International Petroleum Co.'s loading station. As the year ended, Island Oil & Transport Corp. closed its station, loading out its cleanup cargo in January (last month), and now, it too, will sell what south field production it has presumably to the Mexican Eagle Oil Co., which has ben gathering up this minor production for some time from companies operating in the south fields that found it more economical to sell than to attempt to move their own oil. In short from the south fields today, there are the following lines (pipe) to Tampico; Huasteca Petroleum Co., easily the first; Mexican Eagle Oil Co., Mexican Gulf Oil Co. To the coast at Port Lobos the only lines in operation are International Petroleum Co. Of course at Tuxpam, as has ever been, Mexican Eagle Oil Co. and Penn Mex Fuel Co. have sea loading stations at terminii for their respective pipe lines. Everything else in the south fields has either been taken up and shifted north or else virtually abandoned.

In the north fields, the most notable pipe line construction during the year was Huasteca Petroleum Co. (Mexican Petroleum), two 10-inch lines from the Ebano Field to Tampico terminals. Transcontinental Petroleum Co. also constructed two 10-inch lines from Cacalilao to Tampico, and is now laying gathering lines from Cacalilao into Paciencia, the productive lease just north of Cacalilao it has been drilling for the account of Penn Mex Fuel Co. and from which, as yet, no oil has been run.

The above rather sums construction work in 1924. Suffice it that the northern fields, within and in reasonable distance of where production is or might be secured, offers no particular trapsport problems, and if oil is secured it can be, and will be, moved quickly if the market continues as it is.

USE OR CONSERVATION OF TEXAS GAS ARGUED AT AMARILLO, AUSTIN

(Continued from Page 58)

development of oil shale in the Rocky Mountains. It is said that Colorado shale can provide the raw material for making all the carbon black the country will need for a generation.

It is estimated that if 25 per cent of the normal gas production of the Texas Panhandle were sold at 8 cents per 1,000 feet, which is a prevailing price at the well in Oklahoma, the daily income of gas well and royalty owners would be $2,000,000.

As Argued at Legislature

AUSTIN, Tex., Feb. 23.—Carbon black has landed on the legislative map, and may be the center of a resounding fight during the balance of the session.

The Panhandle of Texas, sparsely settled, has a vast gas field, 30 miles wide, and 140 miles long, with some oil possibilities. This field has gas for more than 1,000 feet up and down. The city of Amarillo, 40 miles from the line of the field, is supplied by one well. The field is capable of 1,800,000,000,000 feet of gas every 24 hours.

A pipe line to Dallas would cost around $9,000,000, and difficulties of pumping gas so far, added to the cost, make it probable that capital could not be enlisted.

The gas is "wet" gas, capable of producing small but respectable quantities of gasoline. The operators could easily manufacture gasoline, but they are not permitted to turn loose the "dry" gas after it is taken out, because of the conservation law.

The railroad commission's oil and gas conservation bureau has granted permits for carbon black plants to burn residue gas, but these plants have been located in the oil strata, where the gas, to begin with, was incidental to oil production, and has not permitted any plants to be located in a purely gas-producing section.

The capital necessary to establish the gasoline plants and carbon black plants cannot be safely put into the business without a definite law, assuring the continued operation of the plants after they are built.

Gas Men's Contention

One of the men who is here in the interest of getting a new law for the Panhandle country—the unsettled section—alone, has drilled a well, at a cost of $40,000. He struck gas, and has a well capable of producing 60,000,000 feet of gas a day for an unlimited period. Yet that well is a liability instead of an asset, and he cannot get a dollar out of it.

The operators and gas people who are here declared they are not interested in their own particular properties primarily. They will favor, and will ask representatives from the Panhandle section to introduce a bill patterned after the Oklahoma law, requiring that such plants as may be stablished, shall be required to buy gas from all producers offering it, prorated on an equitable basis.

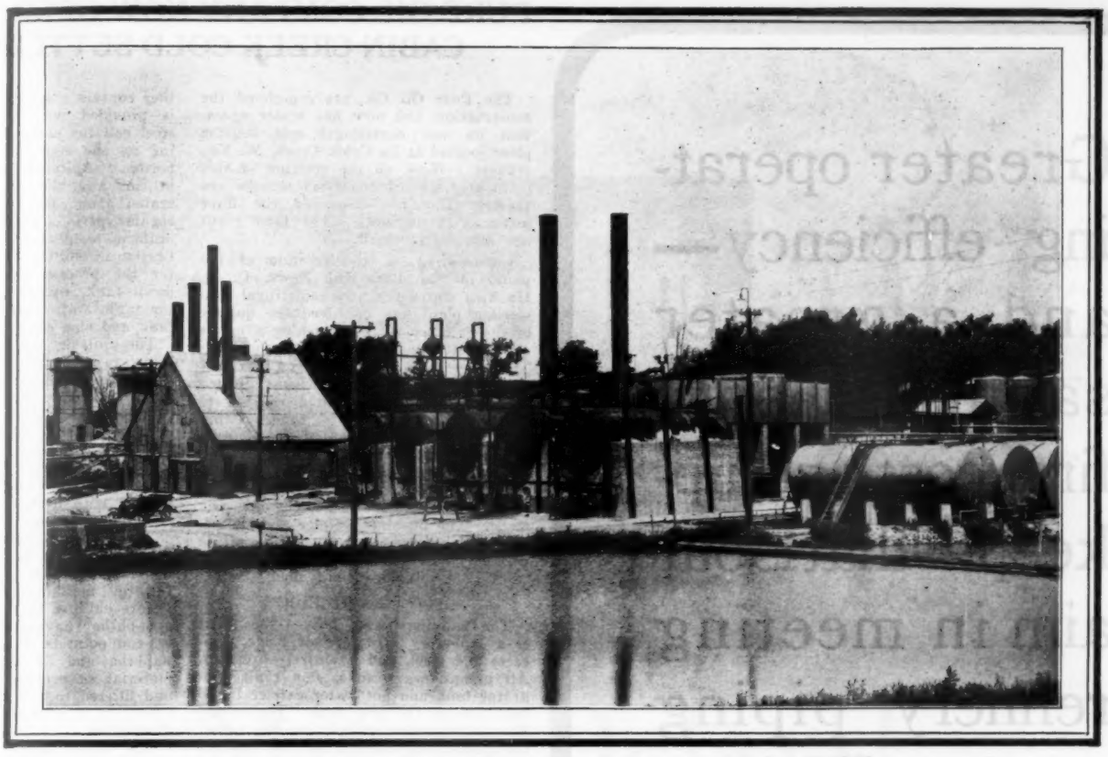
The gas men say that they want the regulation of the proposed industry, by the State. They want it suyervised and controlled by a State agency, for the protection of all interests alike. They say that with the opportunity given them, the east side of the Texas Panhandle can quickly become a big factor in the production of gasoline, and bring in big manufacturing plants, populate that section, and turn the biggest gas field in the world into a productive field rather than a dormant, unused storage of potential wealth.

NEW CONCERN FORMED TO HANDLE EQUIPMENT

The Crowell Co. has been formed to handle a complet line of patented oil well drilling specialties including gas traps, valves, casing packers and cementing shoes. The company will act as the representative in the Mid-Continent of the Lorraine Corp. of Los Angeles and will distribute that firm's products in Oklahoma, Kansas, Arkansas, Louisiana and Texas. The company was formed by A. B., E. V., and F. M. Crowell. M. L. Crouch of Los Angeles, representing the Lorraine Corp., was in Tulsa recently closing arrangements with the Crowell Co. The latter concern is located in its own building at 406 West First Street, Tulsa.

WORK ON LINE FROM EBANO

The Huasteca Petroleum Co. (Doheny) has completed 49 kilometers of its second 10-inch pipe line from its heavy oil production in Ebano. The part finished starts from Ebano and terminates at a loading station on the Panuco River, from which point oil is being barged to the Tampico terminal, pending the completion of the line. The first line completed is handling 28,000 bbls. daily from Ebano into the terminal, a distance of 65 kilometers. The new line is the first long welded line to be completed in Mexico.



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LARGE refineries are using Sublimed Blue Lead in Oil for metal preservation and rust prevention because of its complete satisfaction. The Wilhoit Refining Company of Joplin, Missouri, are so well satisfied with the Eagle Sublimed Blue Lead used on their tanks that they are using it also for the painting of their smoke stacks.

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PURE OIL COMPANY NOW OPERATING CABIN CREEK COLD SETTLING PLANT

The Pure Oil Co. has completed the construction and now has under operation its new centrifugal cold settling plant located at its Cabin Creek, W. Va., refinery. Work on the erection of this plant was started about six months ago shortly after fire destroyed the filter plant at the refinery. The filter plant has also been rebuilt.

Commenting on the erection of the plant in the Pure Oil News, C. G. Hankins states the new centrifugal cold settling plant has improved the quality of the cylinder stock furnishing a motor oil of better color and lower pour test. The process also eliminates the wax flux which appeared in the oil when subjected to low temperatures and permitted to stand for any length of time. Cabin Creek crude oil is particularly adapted to the manufacture of bright stocks because of its light color. The residual stocks require no acid treating, the desired color being attained by filtering alone. The filtering to color and the removal of amorphous wax is all that is necessary to transform the cylinder stock to a valuable bright stock.

Description of Plant

The building which houses the plant is a two-story structure of brick, concrete and steel, and is entirely fireproof. All pumps, wax tanks, slop tank, separator tank and hot water carrier liquid tank are on the first floor. The second floor is occupied entirely by the super-centrifugal machines, while the elevated oil supply tank is in the apex of the building about 10 feet above the second floor level.

The refrigeration necessary for this process is supplied by one 110-ton Carbondale ice machine which furnishes brine at a temperature of about 20 degrees Fahrenheit. This refrigeration is sufficient to chill 100,000 gallons of oil from 100 degrees Fahrenheit. to 10 degrees through a period of 48 hours.

The heating and blending tank has a capacity of 1,800 bbls. and is built of quarter-inch steel. This tank is equipped with heating coils to raise the temperature of the oil to 115 degrees Fahrenheit. over a period of 5 hours. and a mechanical agitator to insure perfect dilution without loss of naphtha. The chilling tanks are of the same construction as the heating and blending tanks. These tanks are insulated on the bottom with 4 inches of cork and on the sides 4 inches of Johns-Manville hairfelt, over which is a layer of white top roofing. The insulation of these tanks is necessary because of the low temperature to which the oil they contain must be brought. Each tank is provided with 8,400 feet of 2-inch steel coil for chilling brine the inlet being at the top and the outlet at the bottom. Agitators are provided as in heating and blending tank and are operated about 10 minutes each hour at regular periods for 48 hours to insure uniform temperature and present stratification in chilling. Othe tanks necessary for the process are wax free oil run down tank, carrier liquid tank, separator tank, wax tank, elevated oil supply tank and slop tank.

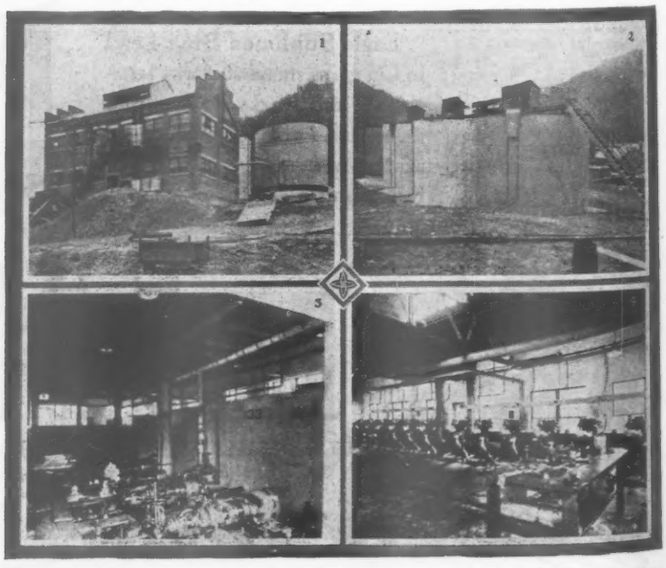
The chilling and transfer of oils and brine require the use of nine pumps which are all of the motor driven rotary type. All fuses for these and also for centrifugal machines are placed on the outside of the building, while the switches necessary inside the building are of the oil type. The oil lines handling all cold oil and brine have been insulated with hairfelt insulation, also all valves and fittings.

Bright Stock Process

The following is a description of the manner in which the plant is operated for the manufacture of bright stock: Before chilling the stock is diluted with a naphtha (having an initial of 180 and an end point of 385) using 61 per cent naphtha and 39 per cent stock. The material so prepared is then passed to and filtered to a 6 color. After filtering operation it is then pumped to cold settling plant.

The dilute stock is pumped to the heating and blending tank and brought to a temperature of 110 degrees Fahrenheit, agitating at the time to insure a perfect solution. From here it is taken to one of the chilling tanks where it is chilled gradually through a period of 48 hours to a temperature of 10 degrees Fahrenheit. The chilled oil is then passed continuously through the battery of super-centrifuges which separate the wax from the oil. The wax free oil is continuously discharged from one outlet of the machine while the wax is passed out another.

The essential feature of the centrifugal separation of wax from lubricating oil is the continuous discharge of the wax from the machines. For this purpose a special rotor has been constructed. Hot water at a temperature of about 140 degrees Fahrenheit, termed "carrier liquid," is fed by jets into the head of the machine. The carrier liquid being heavier than the wax or oil maintains itself as a flexible carrier in the form of a cylindrical layer on the periphery of the rotor of machine. The stiff wax is de-



Centrifuge cold settling plant at the Cabin Creek refinery, Pure Oil Co. (1) Main building. (2) The two insulated tanks are for cold settling and the other two are for blending purposes. (3) Portion of first floor. (4) Portion of second floor showing centrifuge machines.

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posited upon the surface of the water and is conveyed from the machine by it. In other words, it insures a complete and continuous separation of the wax from the oil, making possible the production of a stiff oil free wax. In addition, by utilizing hot water as a carrier liquid, the wax is melted as rapidly as it is discharged from the machine, that it may flow by gravity to the wax run down separator where the water and wax are separated by gravity. The water flows automatically to the hot water carrier liquid tank from which it is pumped back through the system and re-used. The dehydrated wax flows to the wax free oil run down tank from which it is pumped to storage.

CRACKING CAPACITY COMPARED BY AREA

(Continued from Page 104)

contains 38,000 bbls. of Standard refining capacity that is equipped with cracking units, compared with 77,300 bbls. of independent refining capacity equipped with a variety of types of cracking plants. In Oklahoma there is only one refinery, the Tidal at Drumright, that is equipped with Burton cracking stills. In comparison with this there are 113,500 bbls. of independent refining capacity that is equipped with a dozen different types of cracking processes. In Texas, Burton or other Standard processes are installed at refineries totalling 71,800 bbls. of daily capacity, compared with over 240,000 bbls. of independent refining capacity. In Arkansas the Lion Oil & Refining Co.'s 12,000-bbl. plant is equipped with Burton stills compared with four other processes installed at refineries with 9,000 bbls. aggregate capacity.

In Louisiana, however, Standard cracking units are installed at refineries with 84,600 bbls. daily capacity compared with 63,500 bbls. capacity at which other type units have been installed.

Equipments in Service

In the aggregate, in the Mid-Continent-Gulf Coast area, refineries with a total daily capacity of 211,400 bbls. have been equipped with Standard type cracking units while 503,000 bbls. of refining capacity have been equipped with other type processes. In other words, in the area which is today producing over 50 per cent of the oil in the United States only about 30 per cent of the refining capacity that is equipped with cracking units is operated by what is usually referred to as "Standard" companies, while about 70 per cent is in the hands of so-called independents.

In the Rocky Mountain area, with over 107,000 bbls. of daily refining capacity, cracking units have been installed at refineries aggregating 83,000 bbls. Of this amount 65,500 bbls. are at Standard refineries and 17,500 bbls. at independent refineries. As the Standard of Indiana is today the dominant factor in the refinery situation in this area it naturally follows that Burton cracking units are used. In this connection it is interesting to note that in 1924 the gasoline recovery for this entire area was 44.5 per cent or one-third more than in either the Mid-Continent-Gulf Coast or the eastern areas and more than twice as much as the Pacific Coast.

With an average production of over 628,000 bbls. of crude a day in 1924 California had an aggregate refining capacity of over 760,000 bbls. of which 428,000 bbls. were equipped with cracking units. Of this total 200,000 bbls. of capacity were at Standard plants (100,000 bbls. at El Segundo near Los Angeles and 100,000 bbls. at Point Richmond near San Francisco) and 228,000 bbls. were at independent refineries.

National Summary

On May 1, 1924, out of 574 refineries in the United States, 163 were equipped with cracking plants. Out of slightly over 3,000,000 bbls. aggregate refining capacity 1,835,000 bbls. were at refineries with cracking plants. And of the 1,835,000 bbls. about 784,000 were at Standard plants or independent plants to which Standard processes had been leased, while slightly over 1,000,000 bbls. of independent refining capacity had a rather wide variety of cracking processes.

According to Standard of Indiana's figures, which are the best available, about 2,000 cracking units had been installed up to the early part of 1924. Of this number about 1,600 were Burton type and about 400 were of other types. It follows that Burton and other Standard type stills are cracking at least a proportionate amount of the oils of different kinds that are going through cracking stills.

Real conservation is a "measurable" factor in industry—and when we begin comparing the average gasoline recovery for 1924 with the average for previous years, the farther back we go the larger the "conservation" of crude oil grows. In 1924 we produced 213,000,000 bbls. of gasoline which, if our refineries had operated on the basis of 1914, would have required the running of at least 1,700,000,000 bbls.

Of the several factors which have saved us from this situation which the producers of crude could not possibly have met, the cracking plant and the natural gasoline plant have been the most important.

ECONOMIC ASPECTS OF THE CRACKING SYSTEM

(Continued from Page 106)

United States of 18,000,000 bbls. and another 20,000,000 bbls. for the year 1925 over last year, it behooves the refiner to question not alone the source of his crude oil supply, but to ask the question as to how he is going to keep up his gasoline production in view of the increasing number of automobiles from year to year, with the estimated requirements of 1928 of 10,000,000,000 gallons of gasoline. The increasing demand for straw distillate and gas oil for domestic and Diesel engine use has made it economic to convert them into gasoline, when compared to low price fuel oil.

It appears that fuel oil or heavy crudes per se will be the dominant charging stock for conversion into gasoline and this can be accomplished without the necessity of preparing a special charging stock for cracking, by subjecting the heavy oils to the expensive process of coking. In view of the diminishing crude oil production and the increasing use of gasoline, the oil industry is driven more and more to the necessity of commercial cracking of heavy oils into more than 50 per cent gasoline.

Questions for Refiners

Some of the questions which the refiner should ask himself before installing the cracking process are as follows:

(a) Kerosene.
(b) Straw distillate.
(c) Gas oil.
(d) Fuel oil.
(e) Low grade crude oils.

2. Flexibility in cracking all type of oils without the necessity of mechanical changes in the system;

3. Cost of installation per barrel of gasoline produced;

4. Low fire hazard involved in the process;

5. Fuel consumption per barrel of gasoline produced. This should be practically zero, due to the fact that the uncondensable gas produced during cracking is sufficient in quantity to carry on the cracking reaction when the system is producing gasoline.

6. The production produced, as
(a) Gasoline, passing all specifications;
(b) Coke formation. The coke value from cracking, depending upon the location of the refinery, ranges from $6 to $18 a ton;

7. The organization back of the process should give service continually, not alone assisting in the solving of different plant problems of the refiner, but continuous development to improve the process and installing same as rapidly as they are shown to be commercially satisfactory.

8. Full patent protection against all litigation whatsoever in connection with the process.

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The service offered in the No. 10 Standard is typical of Austin Service on the largest, most complex type of building project—complete plants or single factory buildings—multi-story or single story.

The Austin Unit Responsibility Plan shoulders the whole load of every detail of design, construction and equipment, under one contract carrying a guaranteed lump-sum price, a guaranteed delivery date with bonus and penalty clause if desired, and guaranteed quality of materials and workmanship throughout.

Some of the Reasons Why Austin Can Give You This Guaranteed Building Service

1 Large stocks of essential materials, such as structural steel, steel sash, glass, lumber, and standard factory doors, are maintained.

2 Austin owns a great amount of labor saving equipment, such as locomotive cranes, steam shovels, hoists, etc., available over night for any job anywhere.

3 Austin Standard or Special Buildings, designed for economical construction, meet every industrial requirement.

4 Austin Standardized Structures are a profitable investment because of their adaptability to a variety of manufacturing purposes.

5 A day saved in construction is a day gained in production. Your building will be ready for useful occupancy in 30, 60, or 90 working-days, depending upon the size.

6 Austin's success through more than fifty years of experience guarantees building success *for you.*

7 Austin localized, yet country-wide, building service is available through 13 Austin Branch Organizations.

8 Austin Building Service is a complete service, including layout, design, construction and equipment which can be handled under one contract and with Unit Responsibility.

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SPECIFICATIONS

Excavation and Grading for standard foundations and floors. Based on normal site and conditions.

Concrete Foundations—Depth 2 ft. 6 in. to 4 feet below floors. Concrete floors 5 inches thick.

Brick Side Walls.

Rolled Steel Side Wall Sash, Fenestra, or equal. Glass, ⅛-inch factory ribbed.

Mechanical Sash Operators, for monitor sash.

Concrete Window Sills.

Structural Steel Frame with heavy rolled sections, center aisle columns punched for crane columns and girders.

Roof Structure, structural steel trusses, steel or yellow pine purlins and roof sheathing. Trusses designed to carry 2,000 lbs. at any panel point.

Roof Waterproofing, 4-ply built-up composition roofing.

Austin No. 10 Standard Building. Width, 150 ft.; can be varied in multiples of 50 ft. Length, any multiple of 20 ft.

THE MEANING OF FUEL OIL SPECIFICATIONS

(Continued from Page 88)

and liquid to be tested should be as nearly as possible the same as the temperature of the surrounding atmosphere. In reading the hydrometer the eye should be in line with the liquid level and the point on the scale read, allowing for the rise of the liquid on the stem due to capillary attraction.

Flash and Burning Point

The flash point of an oil is the temperature at which sufficient vapors are given off to momentarily flash when a small standard flame is brought near the surface of the oil. When this temperature is raised above the flash point a temperature will be reached at which sufficient vapors will be given off to burn continuously when ignited with the above mentioned flame. This temperature is known as the burning point or fire point. An apparatus with standard specifications and a standard method of procedure is used in making these tests, which apparatus is known as a flash and fire cup.

Water and Sediment Content

This is determined by centrifuging a given quantity of the oil in a standard centrifuge machine. The oil is contained in a graduated glass tube. The water and sediment, being heavier than the oil, are separated by the centrifugal force. A distinct line of demarcation occurs between the sediment, water and oil. Where the oil is heavy and viscous, as in the case of fuel oil, gasoline is mixed with the fuel oil in given percentages by volume to cut it, thus allowing the water and sediment freer action to separate from the oil. In the heavier asphalt oils, some of the asphalts are not soluble in the gasoline. The asphalts then act in the same manner as the sediment and water itself and no separation takes place. In such cases, carbon disulphide, or benzol, is used with the gasoline, these asphalts being soluble in such a mixture. After having determined the line between the sediment, water and oil in the graduated glass tube, the per cent can be computed. In most cases the graduation is such that when the proper per cent of solvent is used with the oil the reading is direct and needs no computation.

Sulphur Content

There are traces of sulphur in all fuel oils. However, this is not objectionable unless the content is over 1 per cent. The sulphur has a corrosive effect upon any metal surfaces with which the oil comes in contact. In this way, tanks and pipe lines are corroded. This action in tanks and pipe lines is comparatively mild as compared to the action of the sulphur during combustion in furnaces. Here the sulphur is united with oxygen forming sulphide dioxide (SO_2) which is a very corrosive gas. This gas attacks the surfaces of boiler flues or any other metal surfaces with which it comes in contact. Especially is this true and to a greater extent in a metal stack. The deterioration in a metal stack is greatly increased where the fuel oil carries a high sulphur content. For this reason, especially, large consumers of fuel oil are very rigid on their requirements of minimum sulphur content.

The quantitative test for sulphur in fuel oil is as follows: A very small weighed sample of the fuel oil to be tested is placed in an oxygen bomb similar to the one which will be described under the test for determination of calorific value. A small quantity of water is placed in the bomb first. The bomb is then filled with oxygen and the entire mass, fuel oil, and oxygen, is ignited inside the bomb. After ignition and time has been allowed to cool the bomb in the water, the CO_2 gas is allowed to escape slowly from the bomb. The sulphur is now in the form of H_2SO_4, having combined with the oxygen of the bomb and the hydrogen of the oil. The bomb is then opened and washed out thoroughly with pure water, saving all the washings in a beaker. This washing, or filtrate, should next be filtered. To the filtrate there is added concentrated H Cl and saturated bromide water. This is boiled down to a more concentrated form. Hot Barium chloride is then added. The barium unites with the sulphate (SO_4 Radical) forming barium sulphate ($Ba\ SO_4$) which is weighed and the sulphur computed therefrom. This description is general. In practice many details must be carried out for accuracy.

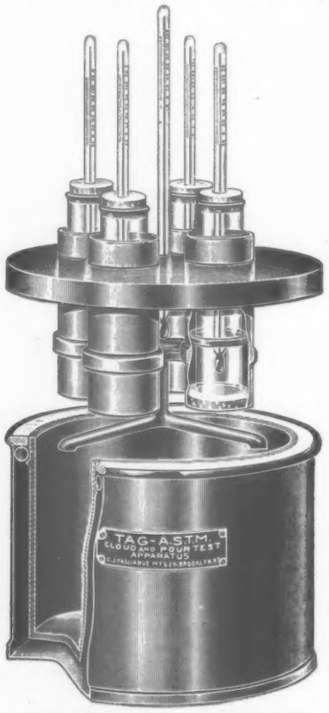
Cold and Pour Test

This is the lowest temperature at which oil will pour or flow when it is chilled without disturbance under certain standard specified conditions.

The oil is put into a standard test jar at atmospheric temperature, or to be more exact, about 90 degrees Fahrenheit. The test jar is then tightly corked, a thermometer being inserted in the cork. The temperature of the oil is brought down until the oil ceases to move when held so the surface is vertical. This temperature is what is known as the solid point. A temperature 5 degrees Fahrenheit higher than this is the pour point.

Viscosity

This is the measure of the internal friction of the oil itself. It is expressed in terms directly opposite to fluidity. In other words, the viscosity of an oil is inversely proportional to its fluidity.

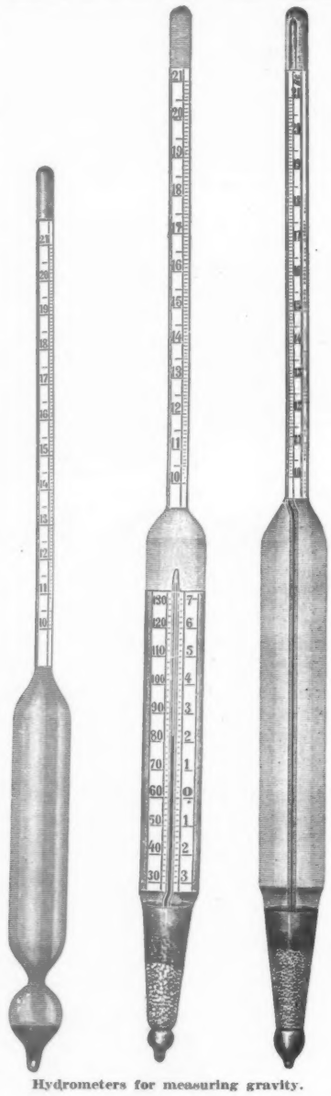


Cold and pour tester for determining cold test.

From the standpoint of the viscosimeter (instrument for measuring viscosity) the viscosity of a given oil is the time, in seconds, required for a given quantity of this oil to flow through a small standard sized orifice at a stated temperature. The measure of viscosity is not all based upon one standard instrument and procedure. Consequently, in order to definitely fix the specification of viscosity, the following additional data must be given: (1) make of instrument, (2) temperature of the oil inside the instrument at the time viscosity was determined. Viscosimeters in common use are Saybolt, Tagliabue, Redwood and Engler. Common temperatures at which viscosimeters are determined: 60, 100, 110, 130, and 210 degrees Fahrenheit. For example, an oil which is said to have a viscosity of 300 at 210 Saybolt, means that a Saybolt viscosimeter was used, that the oil was kept at 210 degrees Fahrenheit during the test and that it took 300 seconds for the given quantity of oil to flow through the given orifice. This given quantity will be constant for all Saybolt instruments.

A viscosimeter is described as follows: A cup, or standard oil tube in the center contains the oil to be tested. Around this is a bath. Bose these are enclosed to prevent any appreciable loss in temperature. Standard thermometers are inserted in both oil tube and bath. Paddles with turn-table handles are also inserted for stirring the oil in the oil tube and liquid in the bath. A small tube leading out of the lower end of the oil tube is closed by a stopper to which is attached a loop string for quick action in opening when the test is started. A glass receiving flask which holds a given quantity of oil up to a certain mark upon its thin neck is used. The apparatus is equipped with some form of heater (gas or electrical) for heating the oil by means of the bath.

To obtain the viscosity of an oil with this instrument locate it in a room where there will be no appreciable variation in temperature during the test. Heat the oil and bath separately to a temperature slightly below the temperature at which viscosity is to be taken. Pour a given quantity of the oil into the standard oil tube. Then bring oil and bath up to the desired temperature, stirring with the paddles to maintain an even temperature throughout oil and bath. Place the receiving flask under the stopper in the oil tube. Jerk the cork out, at the same time starting a stop watch. Keep temperature constant during the time the oil is dropping into the receiving flask. When the oil has filled the receiving flask up to the mark on its neck, stop the watch and the time elapsed in seconds is the viscosity at the given temperature. In some viscosimeters this time is divided by the time required to make the same test with water.



Hydrometers for measuring gravity.

Calorific Value

The calorific value of fuel oil is the amount of heat it contains, or in other words, the amount of heat given off during complete combustion. Where fuel oil is purchased for heating purposes, it is self-evident that the calorific value is an imporant criterion as to the worth of the fuel. This is expressed in terms of the number of heat units per unit of weights of the material. In fuel oil it is generally expressed in B.t.u. per pound. The B.t.u. (British thermal unit) is the amount of heat necessary to raise the temperature of 1 pound of water 1 degree Fahrenheit, or to be more exact, it is the amount of heat necessary to raise the temperature of 1 pound of water from 62 to 63 degrees Fahrenheit. In other words, the calorific values of a fuel oil is the number of B.t.u.s of heat produced when 1 pound of oil is completely burned.

The calorific value could be calculated theoretically by the ultimate chemical analysis. For example, referring back to the combustion formula, the carbon (C) and hydrogen (H) unite with the oxygen (O), forming CO_2 and H_2O. When one atom of carbon unites with two atoms of oxygen a certain amount of heat is produced, and likewise when the two atoms of hydrogen unite with the one atom of oxygen. From the atomic weight of the carbon, hydrogen and oxygen, the number of atoms per pound could be computed and consequently the total heat could be calculated. This, however, would only be theoretical and not practical since misleading and erroneous results would be obtained. The heat of combustion must necessarily be what the entire mass or combination of elements can produce in the way of heat. In other words, we burn fuel oil under boilers, stills, etc., instead of burning single atoms.

Use of Calorimeter

The calorific value is actually obtained by the use of an apparatus known as a calorimeter. In this a given quantity, by weight, of the oil to be tested is completely burned inside of a closed container (bomb) which is surrounded by a given quantity, by weight, of water. The heat generated by the combustion is transferred to the water and the amount calculated by the increase in temperature of the water. Of course all parts of the calorimeter are insulated where necessary so there is no appreciable loss of heat. The combustion takes place in this small steel bomb. The given quantity of fuel oil is put in the bomb and the bomb filled with compressed oxygen to cause quick and complete combustion. A given quantity of water, at about 40 degrees Fahrenheit below room temperature, the water being weighed first, is placed in the container or water jacket in the apparatus.

The bomb is submerged in the water and the materials on the inside are ignited through an electrical connection, which goes to the inside of the bomb. A stirrer made of paddles is kept rotating in the water to maintain an even temperature throughout so that the thermometer registers accurately the temperature of the water. Thus the actual amount of heat transferred to the water is measured. The details, many of which are omitted above, are carried out with extreme accuracy, allowing for such factors as the heat of the igniter inside the bomb and the radiation loss of the water. With this procedure the results will be recorded in B.t.u. per pound. To convert this into calories per gram multiply by 5/9. The B.t.u. per gallon is equal to the B.t.u. per pound multiplied by the weight, in pounds, per gallon of the fuel oil. To obtain the evaporation power in steam boilers, multiply the B.t.u. by 1.035.

The number of B.t.u. per pound varies with the gravity of the fuel oil. The lighter the oil the more B.t.u. per pound. This, however, is not an absolutely accurate determination since the character of the fuel oil will modify this to a small degree. An approximation can be obtained, however, by this formula: B.t.u. per pound = 18,700 + 40 (gravity Be 10). For example, according to this formula, a 20 gravity fuel oil will have 19,100 B.t.u. per pound.

Per Gallon and Per Pound

Right here enters in the unique saying: "The heavier the fuel oil the more B.t.u. per gallon and the less B.t.u. per pound." This most certainly appears to be a contradiction to the average mind which has

For the Good of the Industry

IN forming production, refining or sales plans, the executives of this company always ask the question, "In addition to helping us, does this plan work *for the good of the industry?*"

Over-production has been a recent evil. Skelly met it with a greatly decreased drilling schedule. Why? *For the good of the industry.*

Excessive refinery operations brought spot markets to new low levels. Skelly refinery runs were curtailed, *for the good of the industry.*

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The reason for this attitude? Simply that whatever is *for the good of the industry* is for the good of Skelly, also.

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not gone deeply enough into the subject to actually work it out. The reason for it is that the weight per gallon (which also represents B.t.u.) increases at a much faster rate than the B.t.u. per pound decreases. For example, compare a 25 gravity fuel oil with a 20 gravity fuel oil. The 25 gravity fuel weighs 7.52 pounds per gallon, while the 20 gravity fuel weighs 7.77 pounds per gallon, an increase of 0.25 pounds per gallon. The increase in B.t.u. will be 0.25 of 19,200 or 4,800 B.t.u. Now take it from the standpoint of decrease per pound, the 25 gravity fuel has 19,300 B.t.u. per pound, while the 20 degrees gravity has 19,100 B.t.u. per pound, a decrease of 200 B.t.u. per pound. The average weight per gallon being 7.64 pounds, the decrease will be 1,528 B.t.u. per gallon. It will be seen from this that the increase exceeds the decrease by 3,272 B.t.u. Again multiplying the weight per gallon by the B.t.u. per pound at 20 degrees gravity and the same at 25 degrees gravity, the same increase will be shown in favor of the 20 degrees gravity fuel. Since fuel oil is bought and sold by the barrel (gallons) and not by the pound, the heavier fuel is the more valuable from the standpoint of heat units, provided the burner conditions are such that the heavier fuel can be burned with the same efficiency.

Specification Applied

In years gone by the gravity was the main consideration in the purchase of fuel oil. It still holds an important place. Needless to say, in sections of the country where the variation in temperature is great between summer and winter, with ordinary fuel burning apparatus a lighter fuel is required for winter than for summer use, since the heavier fuels actually congeal in the winter time. As mentioned above, the gravity determines in a large measure the heat value, which of course means dollars and cents to the consumer.

The flash and burning points of the fuel enter in, due to the fact that the temperatures at the point of combustion vary with different conditions. If a hot fire is the condition, a higher flash and burning point fuel can be used; but if the conditions are such that a fire of less temperature is used, the fuel should be of a lower flash and fire in order to bring about good combustion. Of course the fuel must be a flash high enough to eliminate undue dangers of explosions while it is being handled near any fire.

Any water or sediment in the fuel is more than a total loss. In addition to the fact that there is no heat value therein, heat is required to bring it up to the furnace temperature. It also tends to clog up burner equipment and when present in excessive amounts forms, to a small degree, an emulsion with the fuel oil which renders combustion very inefficient.

Sulphur in fuel oil, in addition to its corrosive action on metal surfaces with which it comes in contact, as mentioned earlier in this article, is especially objectionable in the smelting of iron and steel, particularly if present in comparatively large quantities. The sulphur coming in contact with the molten steel or iron will tend to make a poor grade of such. Smelting companies are generally very rigid in their minimum sulphur content specifications.

The Cold or Pour Test

The cold or pour test specification is required particularly from the standpoint of the handling of fuel from tank cars to storage and from storage to burners. If no preheating of the fuel is effected at any time until the oil actually enters the furnace, a low pour test will be required, especially during cold weather. A fuel oil with a high pour test will be hard to handle and will not atomize as readily in cold weather, which is conducive to poor combustion. In general, especially in fuel made from the same crude, there is a sort of relation between gravity and pour test. In other words, the higher the gravity the lower the pour test, but for fuels from different crudes this analogy may be most untrue. For example, a fuel oil of 25 gravity might have a pour test much below zero, or it might be 30 to 60 degrees Fahrenheit.

Since viscosity, figuratively speaking, is a sort of pour test at a temperature higher than the atmosphere, this specification becomes important where the fuel oil is preheated before it enetrs the furnace. For illustration, suppose the oil is preheated to 150 degrees Fahrenheit as it enters the furnace through the burner, then the viscosity at that temperature is an important factor. The lower the viscosity at that temperature the more complete will be the atomization and the better will be its combustion. Since the heating of fuel oil has come into more general use in late years, the viscosity has become a more important factor in the buying and selling of fuel oil.

All other specifications being equal, the real value of a fuel is its calorific value. The consumer pays for heat. However, the heat value must not overshadow the other specifications. For example, it will mean a loss to the consumer if he buys 18 gravity fuel because it contains more heat units and then uses it through burning equipment that will only atomize half of it because of its high pour test.

Relative Value of Fuels

Coal, natural gas and fuel oil are the three fuels used most in the industry. Every consumer who has convenient access to any two or all three of these should study the relation in price of these fuels. Of course, the price must include such items as handling charge, cost of burners, cost of labor, upkeep of equipment and cost of original installations. Assuming all above factors equal, here are some of the relative values on the three fuels:

Price of Fuel Oil Per Bbl.	Price of Gas per 1,000 Feet	Price of Soft Coal Per Ton
$ .50	$ .08½	$ 1.80
.75	.12⅛	2.50
1.00	.16⅛	3.30
1.25	.21	4.10
1.50	.25	5.00
1.75	.29	5.90
2.00	.33	6.70
2.25	.37	7.50
2.50	.41	8.40
2.75	.45	9.20
3.00	.50	10.00

Advantages of Fuel Oil

The handling costs of fuel oil are low. Fires are easily controlled. In the case of steam power time is saved in "steaming up" a cold boiler. A high efficiency in terms of combustion is effected. Comparatively small storage room is required. Chimney areas are reduced to a minimum. There is a minimum of radiation of heat from furnace walls to the atmosphere. Smoke objections are eliminated. The calorific value does not deteriorate while in storage over long periods of time. Lastly, there is a uniform distribution of heat throughout the furnace which means longer lived furnaces and equipment in general.

GEOLOGIST HONORED

LITTLE ROCK, Ark., Feb. 21.—A John C. Branner Geology Club recently was organized by Arkansas geologists at the University of Arkansas at Fayetteville in honor of the late John C. Branner, well known geologist of Arkansas and California and founder of the Arkansas Geological Survey. James W. Pugh of Fayetteville was elected president and H. L. Anderson of Louann secretary-treasurer. Among charter members are Byron Parks, Louis McCabe, Thomas Hendricks, Fort Smith; George Clement, DeQueen; William Magness, Lead Hill; Dr. G. H. Cady, head of the geology department of the University, and Carey G. Croneis, an instructor in that department. The club will be represented at the March meeting in Wichita of the American Society of Petroleum Geologists.

OFFICES ARE MOVED

The Graver Corp. and the Wadhams Oil Co. have moved their Tulsa offices from the Haver Building to 810 Atlas Building, Tulsa, Okla. Charles Marner is in charge of the Graver office and Walter P. Jacobi, the Wadhams office.

To Executives of Oil Companies Who Are Responsible For Their Companies' Earnings

WHEN oil is stored in tanks it is subject to constant loss by evaporation through the tanks' openings unless they are protected with proper tank equipment.

For many years but little attention was given this situation and the losses were tremendous. Old fashioned make-shift gauge holes and manholes, for example, were used which were not gas-tight. Even when closed they let valuable products escape; but often they were left open, allowing not only evaporation but admitting rain, snow and dirt into the oil—in either case constituting a continual fire hazard.

After several years of careful study of this condition, The Oil Conservation Engineering Co. was organized and began the manufacture of a line of tank equipment *especially designed to meet the needs of the industry.*

This company devotes itself as a group of specialists exclusively to this field of tank equipment.

All equipment is designed by men of practical oil field experience with a full knowledge of the conditions it must meet. Then it is built to exactly meet these specific needs. And before placing on the market, it is submitted to the Underwriters' Laboratories, Inc., of Chicago, for testing and approval.

Its use has saved oil companies thousands of dollars both by checking evaporation losses and reduction in insurance premiums because of the protection offered against fire.

The savings effected by Oceco Equipment during even the first year, have frequently been found to pay for the cost of this equipment. In other words, it soon pays for itself and is consequently an investment that invariably appeals to executives responsible for their companies' earnings.

We shall be glad to counsel with you without obligation on your part.

OCECO Equipment

Gauge and Thief Hole Covers.
Roof Manholes.
Safety Tank Winches.
Cable Sheave Brackets
Tank Nozzles.
Breather Valves.
Flame Arrestors.
Fire Extinguishers.

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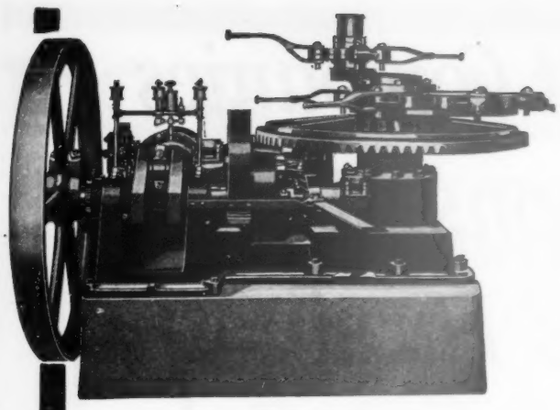
OIL TANK OCECO EQUIPMENT
SAVES EVAPORATION AND PREVENTS FIRE



Learn for Yourself About This Power

If you need compact, strong dependable power, you owe it to yourself to investigate this latest Pattin combination.

Pattin 4-cycle Gas Engine geared direct to single eccentric and disc pumping power. Equivalent to double eccentric. Makes possible perfect balancing of wells without swings. For wood or concrete foundation. Perfectly concentrated power, eliminating belts, and doing away with the large power house.

Made in 8 H. P., 12 H. P., 15 H. P., and 20 H. P. sizes.

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Carried in stock by Frick & Lindsay Co. in Kentucky

PATTIN POWER

N. E. COLORADO WILL GET THE BIG PLAY

(Continued from Page 140)

White River Dome, Rio Blanco County

This is not a Dakota sand test.

The Midwest Refining Co. is drilling a deep test in the SW SE SE, Section 30-2n-102w, Rangley Field, Rio Blanco County. The test will go to the Dakota sands and is now below 2,410 feet. Thus far oil in the Rangeley Field has been produced only from shale found at a very shallow depth.

Status of Proven Fields

The history of the proven fields of northwestern Colorado is pretty generally known. There are three of these, the Hamilton Pool on Hamilton Dome, Moffat County; the discovery of oil on the Iles Dome in Moffat County, and the old Rangeley Pool in Rio Blanco County. The first two produce from the Dakota sands.

The Midwest Refining Co. is drilling a test on the Iles Dome in the SE cor. SE NE, Section 22-4n-92w, Moffat County, in which it found oil in the Dakota sand at 2,630-45 feet on August 30, 1924. This well made 1,100 bbls. of 22 gravity oil the first day but on the second day it was opened it produced one-third water and later this increased to 50 per cent. The sand was cased off and at last reports, the crew was fishing at 2,723 feet. The objective is the Lakota sand. The same company is drilling four wells on the Iles Dome and the second well should be in soon. It has been expected that only a few feet of the Dakota will be penetrated in the second well in an effort to escape the water Three deep dry holes have been drilled on the edges of the Iles structure, all having found sulphur water in the Dakota sand. The Iles Dome is confidently expected to produce oil in commercial quantities but the total production is not expected to be large.

The producing area of the Hamilton Field near Craig will be very small and should not extend over more than 160 acres and it is improbable that any more large producers will be found. The Texas Production Co. is at a depth of 4,054 feet in hard sand in its third test on the Hamilton Dome, located in the NE cor. of Lot 10, Section 9-4n-91w, about three-fourths of a mile southwest of the discovery well. It found the Dakota sand at 4,035 feet and has been producing about 200 bbls. a day. The production of the field now is around 1,000 bbls. a day. The discovery well had produced from July 22, 1924, to January 1, 1925, a total of 243,773 bbls. of pipe line oil. It is showing about 23 per cent water.

Rangely an Old Field

The Rangely Field has been producing for years from depths varying from 440 to 682 feet. The daily production of the field is about 100 bbls. a day. There is a skimming plant at Rangely of 100 bbls daily capacity. The refined products are sold to the Continental Oil Co. The oil yields 40 per cent gasoline, 16 2-3 per cent kerosene, 10 per cent gas oil, 30 per cent wax distillate and 4 per cent tar. Deep dry holes have been drilled in the Rangely area, one of which was sent to 4,700 feet. This was the Standard Oil Co. of California's No. 1 SW SW, Section 21-2n-102w.

Two structures have been condemned in the northwestern area, the Axial Basin in Township 4n-93w and the Beaver Creek structure in Township 4n-89w. The Axial Basin was tested to a depth of 3,951 feet, where the hole filled with water and the Beaver structure, Routt County, to a depth of 3,278 feet, where a hole full of water was found. The latter test, by the Transcontinental Oil Co. in the NE cor. SW, Section 32-4n-89w, is being deepened to the Lakota sand and was last reported at 3,580 feet.

There are about 2,000 square miles of oil shales in northwestern Colorado in Garfield, Rio Blanco and Mesa counties. It is estimated that these shales contain from 9,000,000,000 to 20,000,000,000 bbls. of oil.

The Southwestern Area

The Dakota sands are too near the surface in southwestern Colorado to give any promise for future fields with the exception of the Farmington district. Few wells have been drilled in this part of the State In Montezuma County a 4,584-foot failure was drilled by the Mo-Elma Syndicate in the northeast quarter of Section 23-36n-18w. The test of J. A Leidecker and others, NW SW NE, Section 34-33s-12w, was the most promising well found in La Plata County. It had a good showing of oil in shale at 2,880 feet but the hole was abandoned at 3,600 feet because of a hopeless fishing job. The showing at 2,880 feet was not in commercial quantity. The same operators are drilling another test in the NW cor. Section 3-32s-12w in an attempt to reach the Dakota saind which is expected at 3,800 feet and were last reported at 1,810 feet.

Little Hope in Central Colorado

The Dakota sands and all other sedimentary rocks have been practically eroded in the Central Colorado area which is occupied by the main range of the Rocky Mountains. There are four exceptions, however, these being four comparatively small areas of sedimentary rocks which are called North, Middle and South Parks and San Louis Park. With the exception of the four parks no oil may be expected in Central Colorado. San Louis Park is the most promising of the four. A number of tests have been drilled there but none showed sufficient oil or gas to make them paying producers The Valley Oil Co. is shut down at 4,310 feet in the southeast corner of Section 22-41n-10e, Saguache County, without any important showings. The San Louis Valley Oil & Gas Co. drilled several tests in Alamosa County which had showings of oil and gas between 2,178 and 2,655 feet.

Southeastern Colorado

In southeastern Colorado about the only possibility of oil is in the Gray Permian formation which has been found in the Panhandle of Texas. Nothing has been drilled to this formation and all the dry holes drilled, and they form quite a total, were abandoned at shallow depths. The Mountain States Oil Co. is shut down at 210 feet on a proposed deep test in the southwest corner of the southeast corner of Section 3,34s-62w. Kiowa County has the only deep test in that part of the State. It is being drilled by the Nee-No-She Oil Co. and is in the northeast corner of Section 18-20s-46w. It is shut down at 4,000 feet. There was a small showing of black oil at 3,450 feet. Poor geological conditions in the extreme southeastern part of the State have kept operators out of that region, and the only likely looking territory is centered in Pueblo and Fremont Counties.

Pueblo County was regarded very favorably on account of the shallow depth to the Dakota sand and the large number of well established domes in that area. Many tests were started last spring and all of them were dry below the Dakota sands. Very little activity is expected in Pueblo County in the future, since all of the most favored structures have been found to be non-productive. The deepest of the dry holes was the Midwest Refining Co.'s No. 1, southeast corner B, northwest corner of Section 36-20s-66w, abandoned at 3,945 feet with no showings at any depth.

Fremont County is an old oil country but as oil was found in the shallow-lying shale pockets, very few wells have been drilled to the Dakota sands. The Florence Field was opened in 1876. It is located in Townships 10, 19 and 20, Ranges 69 and 70w. The Mutual Oil Co. controls the field. Between 900 and 1,000 wells have been drilled in that field but only 64 of them are now producing. The most productive well in the field made over 622,000 bbls. of oil over a long period of years. It is among the abandoned oil wells. Six miles northeast of the Florence Field the Mutual Oil Co. is drilling to test the Dakota sands. The well is located in the southeast quarter of Section 1-19s-69w. It had not reached 3,000 feet when last heard from. The only real deep test in the county was the Salida Oil & Development Co.'s No. 1 in the southeast quarter of Section 32-18s-69w, in which a show of oil was found

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at 4,015-25 feet. The hole was abandoned at 4,045 feet.

Northeastern Colorado is the most promising field for exploration presented by the State. Here the Dakota sands, which are the principal hope of Colorado operators, lie buried from 1,000 feet to 8,000 feet in depth. The Ohio Oil Co.'s test of the Haystack Mountain structure found hot sulphur water in the Dakota sand. This well was drilled in the northeast quarter of the southwest quarter of the northwest quarter of Section 28-2n-70w to 3,287 feet. A little show of oil and a great flood of hot water was uncovered at 3,247-70 feet and 3,275-87 feet.

Rocky Mountain's Deepest Well

The Roland Oil Co., an Oklahoma corporation, is drilling the deepest well ever put down in the Rocky Mountain sector. It is located in the southeast quarter of the northeast quarter of the southwest quarter of Section 34-12n-69w, and was last reported running 4¾-inch casing at 6,260 feet. A smal showing of oil was found at 4,700 feet. The Dakota sand is expected around 7,000 feet. This well is already over 50 feet deeper than the deepest well drilled in the Mid-Continent, which was recently finished as a failure in Reagan County, Texas. The deepest test drilled in Oklahoma was sent to a depth of 5,281 feet.

The Repollo Oil Co., a Sinclair organization, has a large block of acreage southeast of Boulder and expects to drill a Dakota sand test.

Eleven Wells on State Land

Horace W. Havens, mineral superintendent of the Colorado State Land Board, reports that 422 oil and gas leases on State and school lands, embracing 506,386 acres, were outstanding on November 30, 1924, compared with 242,051 acres on November 30, 1922. The amount received in rentals, fees, etc., was $52,653 compared with $13,723 at the end of the previous biennial period.

Drilling has progressed upon 14 wells on State lands and a total of 34,166 feet of test drilling has been done. Of these three wells have been abandoned and the others are uncompleted.

Moffat County leads, with 60,084 acres of State land leased; El Paso has 51,050 acres; Weld, 58,640; Saguache, 30,064; Larimer, 23,120; Elbert, 20,640; Alamosa, 28,040, and other counties smaller amounts.

HUMBLE CO. CHAIRMAN QUITS, ON AMBITION TO RETIRE AT FIFTY

(Continued from Page 116)

employes naturally lead me to conclude that my very large interest in the company can be better left to other management than my other private interests which demand my time.

"Besides this, while not politically ambitious in any sense, I am keenly alive to the public welfare of this community and do not desire to curtail the public services which I am now performing.

"I want to take this occasion to thank one and all of the company's officers, directors, stockholders and employes for the great confidence they have shown in me through the years which we have worked together, and I want to assure you that you need not hesitate to call on me at any time if, in your judgment, my advice is needed."

The stockholders accepted Mr. Sterling's resignation and passed the following resolutions of regret:

"Whereas, R. S. Sterling was the moving spirit in the organization and direction of the Humble Oil Co., from which the Humble Oil & Refining Co. took its name, and the property of which formed a large part of the assets of this company upon its organization; and

"Whereas, R. S. Sterling, first as president of the Humble Oil & Refining Co. and later as chairman of the board of directors of our organization, has been a prime factor in the company's growth and success; and

"Whereas, By reason of other business and public and civic affairs in which he is largely interested, requiring his personal attention, he has asked that he be relieved of further duty and responsibility in connection with the management and affairs of the Humble Oil & Refining Co.; now, therefore, be it

"Resolved, That we, the stockholders, officers and directors of the Humble Oil & Refining Co., desire hereby to express to R. S. Sterling our sincere regret that he considers it to his interest to sever his official connection with the company, and likewise to express to him our deep appreciation of his faithful efforts and long service in behalf of the company, and wish him continued success in the other enterprises to which he shall devote his attention."

The stockholders elected the old directors: W. S. Farish, R. L. Blaffer, H. C. Weiss, W. W. Fondren, F. P. Sterling, James Anderson, E. E. Townes, J. S. Bonner, L. A. Carlton, C. B. Goddard and Wallace E. Pratt, the latter in place of R. S. Sterling.

BOARD TO CONSIDER FUEL OIL STORAGE

(Continued from Page 90)

discover new structure yielding large production would strike at the very foundation of the national life of America. It is undoubtedly true that no other single product, whether it be a natural resource or a manufactured product is characterized by such possibilities of disappointment as is petroleum.

There will be talk about the high cost for the storage of petroleum. It is true that Government storage is easily 30 per cent more expensive than private storage beacuse of the more substantial charatcer of the work and the adjacent facilities that are insisted upon, especially by the Navy to make its storage accessible. However, with the costs that have prevailed during the past year, adding the price of the oil to the cost of storage, this total cost per barrel is one that may appear very small five or ten years hence. If the statements of the great body of geologists are true, it is undoubtedly a fact that oil put into the most expensive storage constructed anywhere today could be sold ten years hence at a handsome profit on the entire investment.

Lubricants Also Discussed

The Federal Oil Conservation Board will not only have under consideration the question of the storage of fuel oil, but also the little discussed needs for lubrication which are quite as important as is power. The United States Bureau of Mines, compiling petroleum refining statistics for 1923, covering the previous year, showed production of lubricants to the amount of 14,950,000 bbls., all of which, of course, was not consumed in the United States.

There have been many references to shale oil as a dependence in time of great need, but it is safe to say that no serious consideration is being paid to that industry as an adequate source of supply during any national emergency that may arise in the near future and while methods for the production of oil from shale are in the present state of advancement. The truth is, oil shale has been studied by the United States Bureau of Mines for use at some indefinite period of the future when oil can no longer be obtained by drilling. Director H. Foster Bain said to the writer several years ago when an impetus was being given to improvement in methods of distilling shale oil that the bureau was looking ahead 20 years as it was the duty of this organization of scientists to do. The oil that will be in demand for many years to come in a national emergency in time of war or in peace will be in response to the drill. The shale located in isolated rugged mountains is something for the future.

NEW YORK GASOLINE PROBE

legislative investigation to determine if gasoline prices in New York State are reasonable is provided in a resolution introduced in the Assembly by Assemblyman Kinsley of the Bronx. It carries an appropriation of $15,000.

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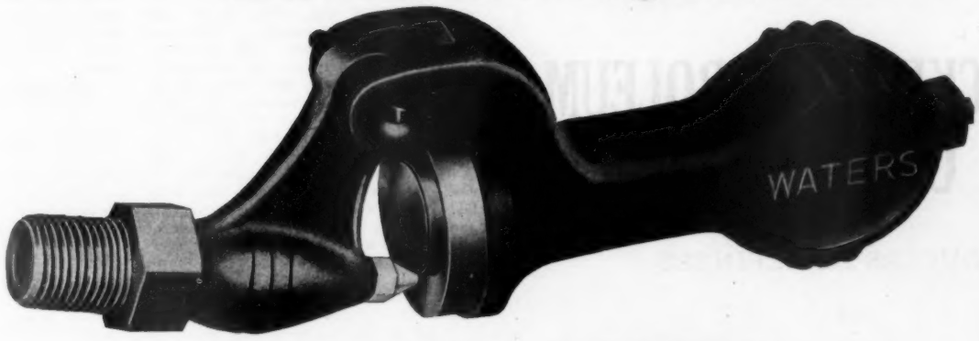

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3 MID-CONTINENT STATES START THE YEAR WITH GOOD PROSPECTS

By James McIntyre

The production of Oklahoma, Kansas and Texas in the first month of 1925 was 31,773,853 bbls. The same three States in the first month of 1924 produced 24,853,354 bbls. Oklahoma in January, 1924, averaged 498,800 bbls. a day as compared with 396,543 bbls. a day in January, 1924, an increase of 102,257 bbls. Texas production in January of this year averaged 444,845 bbls. a day and in January a year ago, 333,449 bbls. a day, an increase of 111,396 bbls. a day. Kansas averaged 81,318 bbls. daily last month and 71,738 bbls. a day in January last year, a gain this year of 10,580 bbls. a day. The combined average daily production of the three States last month was 1,024,963 bbls., while in January last year it was 801,738 bbls., a gain this year of 223,233 bbls.

While California, the Rocky Mountain area and Arkansas show a falling off and Louisiana and the eastern fields did no better than hold their own, Kansas, Oklahoma and Texas scored a comeback and a greatly increased production last month over the same period a year ago. February will tell a different story as production in Oklahoma and Texas will show a decline from the January figures. This will be especially noticeable in Texas, due to the rapid downward trend of Wortham's production. At the same time the production of February in the three States will be in the neighborhood of 124,000 bbls. a day higher than it was in the same month last year.

Crude Price Advances

The recent advance in the price of crude which affected the production in the three States as it did in others was not due to any local condition, but to a general situation.

The production of California in February this year will be about 64,000 bbls. a day below that of February a year ago, while Rocky Mountain area will show a decline of 49,000 bbls. a day. Arkansas may have a decline of about 9,000 bbls. a day, and the eastern fields a slight loss, but Louisiana will register an increase of about 7,000 bbls. a day. The total for the month in the United States will be less than that of February, 1924.

This makes the gain in Kansas, Oklahoma and Texas all the more significant.

In Texas, new areas in Archer County and Reagan County in the north and central fields, Wortham and Richland in the east central field and the Luling Field and Jim Hogg Counties in the southwest fields loomed large in January, this year, while a year before they were either not of importance or oil had not yet been discovered there. In Oklahoma the Tonkawa deep sand horizon, Papoose, Cromwell, Otoe and several yet minor fields were either unknown altogether in January of last year or were of slight importance, while this year they are big factors. In Kansas, Cowley County has come to the front with enough oil to offset any declines in old fields, while Greenwood County may yet be counted as a growing oil territory.

California has been the dominant factor and the price maker for the past two years, but the Mid-Continent area is again out in front, and it is to that territory the industry looks for an increased supply of oil to meet its motor fuel and fuel oil requirements.

Kansas, Oklahoma and Texas oil producers start the year with a most encouraging outlook and with many promising places in which to wildcat with some degree of assurance that their efforts will meet with success.

Already new pools are showing up as a result of wildcatting started last year. In Oklahoma the Hubbard Pool, in Kay County, Donahoo Pool in Pawnee County, and extensions to Papoose and Cromwell are beginning to show with some prominence, while in Texas the Bazette and Kosse areas give promise of production and the Panhandle and north Texas zones are expected to yield further to the wildcatter's persistent efforts.

Following is the production of Kansas, Oklahoma and north and central Texas pools in January. The Gulf Coast and southwest Texas production was run last week, but is included in the summary below:

OKLAHOMA, KANSAS AND TEXAS
Summary of Production in January

Oklahoma:	Average Production Daily	Monthly
Northern fields	434,066	13,456,046
Southern fields	64,734	2,006,754
Total	498,800	15,462,800
Texas:		
North Texas	76,333	2,366,323
Central Texas	51,052	1,582,612
East Central Texas	204,956	6,353,636
Panhandle Texas	1,254	38,874
Gulf Coast Texas	66,474	2,060,694
Southwest Texas	44,776	1,388,056
Total	444,845	13,790,195
Kansas	81,318	2,520,858
Total January	1,024,963	31,773,853
Total December	962,372	29,833,532
Increase	62,591	1,940,319

KANSAS

Daily average and monthly production in January, 1925:

Marion County	Daily	Monthly
Florence	1,204	37,324
Peabody	2,474	76,694
Covert-Sellers	977	30,287
Total	4,655	144,305
Butler County:		
Elbing	3,382	104,842
Potwin	496	15,376
Cameron-Robinson	652	20,212
Wilson-Dunkle	1,955	60,605
Towanda	2,293	71,083
El Dorado	6,130	190,030
Fox-Bush	2,641	81,871
Nuttle-Koogler	1,533	47,523
Sluss	460	14,260
Blankenship	1,048	32,488
North Augusta	1,204	37,324
South Augusta	2,122	65,782
Smock	236	7,316
Douglas	176	5,456
Leon-Weaver	822	25,482
Total	25,150	779,650
Greenwood-Woodson:		
Virgil	4,838	149,978
Seeley	4,282	132,742
Thrall-Burkett	5,128	158,968
Sallyards	1,643	50,933
Polhamus	3,540	109,740
Teeter	3,156	97,836
Miscellaneous	216	6,696
Total	22,803	706,893
Cowley County:		
Rainbow-Bend	8,025	248,775
Slick-Graham	2,990	92,690
Rock (twp 30-4)	548	16,988
Clark (twp 31-3)	111	3,441
Eastman (twps 30-6, 31-6)	934	28,954
Winfield (twps 32-4, 32-5)	1,086	33,666
Miscellaneous	392	12,152
Total	14,086	436,666
Other Counties:		
Rice	89	2,759
Russell	1,061	32,891
Harvey	108	3,348
Chautauqua	2,573	79,763
Elk	844	26,164
Wilson	306	9,486
Montgomery	4,013	124,403
Allen	1,359	42,129
Neosho	765	23,715
Lyon	88	2,728
Miami	590	18,290
Franklin	593	18,383
Douglass	44	1,364
Bourbon	42	1,333
Linn	435	13,485
Anderson	1,661	51,491
Labette	52	1,612
Total	14,624	453,344
Total January	81,318	2,520,858
Total December	81,853	2,537,443
Difference	535	16,585

OKLAHOMA

Daily average and monthly production in January, 1925.

	Daily	Monthly
Washington County	6,004	186,124
Nowata-Roger Counties	5,511	170,841
Burbank	58,644	1,817,964
Osage, outside of Burbank	36,165	1,121,115
Bird Creek, Owasso, etc.	4,216	130,696
Red Fork, Bruner, Sand Springs, Turkey Mountain, Fisher	3,865	119,815
Bixby, Leonard and Jenks	1,808	56,048
Broken Arrow and Coweta	1,354	41,974
Mounds, Beggs, Hamilton Switch and Youngstown	12,136	376,216
Bald Hill	2,423	75,113
Morris and Boynton	2,508	77,748
Okmulgee	2,801	86,831
Henryetta, Schulter and Tigar Flats	2,224	68,944
Wewoka	10,957	339,667
Cromwell	33,147	1,027,557
Deaner-Lyons	4,665	144,615
Papoose-Gilcrease	35,257	1,092,967
Okemah	253	7,843
Weleetka	1,750	54,250
Wetumka	77	2,387
Cushing and Shamrock	23,367	724,377
Glen, Sapulpa and Kiefer	9,416	291,895
Bristow, Kellyville and Depew	28,153	872,743
North Bristow, (twp 17-8)	3,257	100,967
Eastern Bristow	7,890	244,590
Cleveland-Keystone	4,202	130,262

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Martin Tank Company	Corsicana, Mexia
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The Oil and Gas Journal

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Jennings	6,535	202,585
Otoe or Watchorn	8,255	255,905
Yale, Quay and Ingalls	4,717	146,227
March Pool (N. Cushing)	1,716	52,196
Stroud	3,304	102,424
Blackwell	2,097	65,007
Hubbard (twp 26-2w)	106	3,286
Mervine	430	13,330
Braman (29-1w)	2,217	68,727
Ponca City	941	29,171
Tonkawa	96,334	2,986,354
Thomas (25-2w)	239	7,409
Deer Creek	124	3,844
Billings	482	12,462
Garber	4,600	142,600
Healdton	15,548	481,988
Hewitt	16,246	503,626
Fox	2,508	77,748
Brock	1,454	45,074
Graham	10,895	337,745
Tussy or Sholom Alechem	2,045	63,395
Loco-Milroy	2,278	70,618
Kilgore	192	5,952
Comanche	654	20,274
Duncan	6,105	189,255
Walters	1,025	31,775
Hambro (6s-5w)	433	13,423
Cement	1,770	54,870
Robberson	3,123	96,813
Sayre	175	5,425
Allen	268	8,308
Maud (twp 7-5)	15	465
Total January	498,800	15,462,800
Total December	517,135	16,077,685
Decrease	18,335	614,885

NORTH AND CENTRAL TEXAS

Average daily and monthly production in January, 1925:

North Texas:	Daily	Monthly
Burkburnett	13,526	419,306
Electra	17,587	545,197
Iowa Park, K.M.A.	3,649	113,119
Archer County (Holliday) etc	36,298	1,125,238
Clay County	348	10,788
South Vernon	4,925	152,675
Total North Texas	76,333	2,366,323
Central Texas:		
Clear Fork	5,715	177,165
Breckenridge	8,666	268,646
Caddo	5,035	156,085
Gunsight	60	1,860
Ranger-Eastland	6,691	207,421
Rising Star	100	3,100
Sipe Springs	160	4,960
Desdemona	2,745	85,095
Moran and Ibex Pools	2,391	74,121
Pioneer	1,039	32,209
Brown County	920	28,520
Callahan County	2,270	70,370
Coleman County	77	2,387
Jack County	33	1,023
Palo Pinto County	143	4,433
Mitchell	1,707	52,917
Regan County	13,300	412,300
Total Central Texas	51,052	1,582,612
Panhandle:		
Carson County	1,032	31,992
Hutchinson	222	6,882
Total Panhandle	1,254	38,874
East Central Texas:		
Mexia	20,439	633,609
Powell	59,301	1,838,331
Currie	1,453	45,043
Richland	10,427	323,237
Wortham	113,336	3,513,416
Total East Central Texas	204,956	6,353,636
Total all fields, January	333,595	10,341,445
Total all fields, December	251,823	7,806,513
Increase	81,772	2,534,932

Union of California Annual Report Shows $10,704,047 Profit

The annual report of the Union Oil Co. of California, and owned companies, for 1924, issued by W. L. Stewart, president, and R. D. Matthews, comptroller, shows net profits for the year were $10,704,047.90, compared with $8,032,649.39 for the previous year. The profit, before deducting depreciation, depletion, etc., in 1924, was equivalent to 23¼ per cent on the issued capital stock, compared with 22½ per cent on the issued capital stock at the end of the previous year. The percentage of net profit was 11¼ per cent for 1924, compared with 9 per cent for 1923.

Crude Output

Production of crude by the Union for 1924 was 14,658,594 bbls. and by controlled companies 378,358 bbls., compared with a total company and controlled company production in 1923 of 18,808,813 bbls., a decrease in the aggregate of 3,771,861 bbls.

The average daily production of the Union at present is about 46,000 bbls. from 506 producing wells. In addition, 140 wells are shut in, capable of producing about 12,000 bbls. per day. The Union is also purchasing about 52,000 bbls. of crude per day.

The Union's production for the year, together with regular purchases, deliveries by the Independent Oil Producers' Agency and other receipts, aggregated 34,911,642 bbls., or about 15¼ per cent of the 230,000,000 bbls. of commercial oil produced in California for the year.

Development Fields

The principal field development of Union Oil Co. at present is being carried on in the Dominguez and Rosecrans Fields and on the Fort Collins and Wellington structures in Colorado.

The Dominguez Field, discovered by the Union in 1923, is now the second largest producing area in the Los Angeles Basin, the Union's production from this field averaging 15,000 bbls. daily. From the Rosecrans Field the Union is now securing a daily production of approximately 3,100 bbls.

Test wells are in unproven territory at Saugus, Rio Bravo and Wisecarver in California; in Wyoming on the Hale Dome and Lake Creek structures, in Colorado at Elk Springs and Morapos, and in New Mexico at Vermejo Park on the Bartlett Ranch.

Sales for the year amounted to $65,950,218.34, a decrease of approximately $7,000,000 from the 1923 figure, largely occasioned by a decrease in shipments of refining crude to the Atlantic Seaboard during the year.

The total quantity of products sold during the year was 23,342,936 bbls, and in addition, 2,038,086 bbls. of fuel oil were delivered against receipts of refining crude.

Gasoline Exports

The report discloses that large quantities of gasoline were exported to the Atlantic Coast and Great Britain, also Diesel engine oil to London and several cargoes of kerosene to China.

Another factor which tended to reduce the earnings was the decrease in prices of refined products, especially during the last quarter.

Market expansion was taken care of by the addition of 33 new distributing and 68 service stations, representing an expenditure of over $3,000,000.

New Acreage

The report shows that the Union acquired during the year 8,742 acres in California, 4,821 acres in Wyoming, 9,422 acres in Colorado, 124,000 acres in New Mexico, 160 acres in Texas and 3,840 acres in British Columbia, bringing the total of oil lands owned or held in fee up to 802,377 acres, divided as follows:

California	193,640
Colorado	34,110
Wyoming	15,130
New Mexico	124,000
Texas	2,190
Utah	2,560
British Columbia	3,840
Mexico	470
Colombia, S. A.	425,746

The value of these properties is given as $182,010,270, which does not include $28,951,145 representing appreciation of new discovery areas brought in as producing territory subsequent to March 1, 1913, less depletion accrued to December 31, 1924, the values of which properties have not been agreed upon with the natural resources division of the Internal Revenue Department.

Heavy Expenditure

Expenditures for new drilling and field development amounted to $6,013,587. During the year there was expended $237,002 for additions to pipe lines and storage system, mainly for the extension of gathering lines to the new fields in the Los Angeles Basin and for the improvement of existing storage facilities.

For additions to refineries and natural gasoline absorption plants the Union spent over $700,000. The normal daily refining capacity of the company's refineries is about 90,000 bbls. and the gas absorption plants 70,000,000 feet per day.

The current assets aggregate $48,006,774 and are five to one of current liabilities. Cash resources, consisting of cash, United States bonds and treasury certificates, amounted to $10,233,090, an increase of $1,591,612.

The total surplus at December 31, 1924, amounted to $30,383,970. Four cash dividends were paid during the year aggregating $6,675,348, equivalent to 7.2 per cent per annum of the outstanding capital stock.

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FOREIGN MARKET CHEERFUL FACTOR IN THE PRESENT OIL SITUATION

By L. M. Fanning

Foreign markets for petroleum products offer one of the cheerful factors in the present oil situation. There is scarcely one foreign country that does not present a striking picture of undeveloped markets. In Europe there are well defined signs that an expansion of automotive use is under way. How rapid this will be, and to what extent foreign purchases of petroleum products will increase, depends upon the success attained by foreign countries in solving their financial problems—that is, the ability of the people to buy.

Will there be a boom in the export trade this year? Some of the oil men in good position to judge, believe that is altogether too much to expect in the light of the problems still to be solved abroad. Among them is Edward Prizer, chairman of the board of the Vacuum Oil Co. Mr. Prizer recently left for an extended business and inspection trip in Europe. Prior to leaving he told the writer that anyone who expects a big boom in export trade this year is destined to be disappointed.

He thought the best that can be expected is a gradual improvement, and he anticipated increased exports this year over last year, but no gain of a sensational nature. He pointed out that a gradual improvement had been going on since the war, and that a continuation of this, with each year a chance of proportionately greater improvement as the world works around to a more healthy condition after the disorganization caused by the war, can be looked for.

Europe, in Mr. Prizer's view, is poor and is not buying what it ought to buy but what it can buy. While this country has enjoyed a phenomenal growth in motor transportation, European countries which as logically should have kept pace, have had scarcely no automotive expansion. In view of the place the automobile has come to hold as a necessity in modern civilization, this condition as it exists abroad best exemplifies Europe's inability to buy. Mr. Prizer looks for a great expansion in the automobile abroad but this he believes must come slowly.

Germany is in much better shape. France, according to Mr. Prizer, is the key to the betterment of Europe as a whole. The maintenance of the value of the franc is the critical thing. This means that the French Government must balance its budget properly and receive more than it spends. Mr. Prizer thought the French prospects greatly improved due to the Morgan loan and the Dawes plan.

He pointed out that the war has brought a tremendous overturn, but that some things about the situation are very hopeful. The common people are determined to get some of the amenities of life to which they are entitled, and that means a greater demand for the commodities of civilization.

Total exports of crude and refined petroleum products in 1924 were nearly 200 per cent greater than they were in 1913. They amounted to 4,661,673,078 gallons, compared with 3,987,189,964 gal-

EXPORTS OF GAS AND FUEL OIL

(Figures in gallons.)

	Year 1924	Year 1923	Year 1922	Year 1913
Belgium	9,925,931	11,438,846	10,042,040	2,056,609
Denmark	14,237,472	24,925,920	17,297,459	3,060
France	31,148,673	31,972,179	19,884,026	.....
Germany	38,234,743	48,032,616	40,048,832	2,988,990
Italy	87,288,313	54,628,687	22,861,286	8,672,713
Netherlands	27,445,976	22,687,089	24,139,758	10,999,464
Norway	8,199,467	11,707,963	10,932,374	.....
Sweden	13,485,560	11,918,475	8,682,217	.....
United Kingdom	180,721,050	149,979,293	132,347,181	126,394,753
Argentina	36,343,932	53,800,485	4,434,221	476,388
Brazil	2,572,168	4,400,557	1,867,872	884,239
China	41,469,799	29,008,667	19,406,447	.....
Japan	145,735,262	70,923,901	47,382,282	.....
Canada	131,969,289	153,170,797	124,157,908	58,043,963
Panama	162,380,619	197,124,102	44,752,826	37,377,050
Mexico	112,656,782	67,826,176	42,212,115	464
Chile	202,248,442	108,301,812	37,792,057	58,244,417
Other countries	191,487,445	176,746,721	88,978,503	14,387,815
Total	1,437,551,923	1,228,594,295	697,219,404	320,529,925

EXPORTS OF LUBRICATING OIL

(Figures in gallons.)

	Year 1924	Year 1923	Year 1922	Year 1913
Belgium	29,899,518	24,927,380	20,649,941	13,782,639
Denmark	8,774,300	6,145,092	2,946,770	2,166,399
France	64,044,972	55,360,169	50,952,077	26,136,545
Germany	37,757,956	37,028,030	64,686,950	26,418,269
Italy	18,295,166	20,260,532	18,649,097	7,637,394
Netherlands	4,074,599	4,045,581	3,982,190	12,174,926
Norway	1,316,955	1,371,131	1,382,407	410,539
Sweden	2,937,142	3,035,456	2,302,594	2,469,990
United Kingdom	94,418,274	88,460,354	77,195,516	61,412,394
Argentina	7,078,947	7,023,401	5,708,007	5,444,151
Brazil	7,065,389	6,824,778	5,453,687	3,403,672
China	1,908,222	5,476,244	4,744,481	1,309,825
Japan	2,324,643	10,705,688	6,964,630	3,670,102
Australia	2,609,912	9,886,282	7,030,630	4,836,060
New Zealand	4,202,682	2,583,015	1,481,263	1,002,051
Other countries	93,239,648	65,288,389	58,129,387	41,396,543
Total	379,948,325	348,420,523	331,359,687	213,671,499

EXPORTS OF GASOLINE, NAPHTHAS AND OTHER LIGHT PRODUCTS

(Figures in gallons.)

	Year 1924	Year 1923	Year 1922	Year 1913
Belgium	40,181,432	32,230,891	19,932,006	7,668,151
Denmark	18,859,603	10,347,661	9,121,324	878,287
France	258,413,882	229,592,663	162,384,514	19,996,197
Germany	37,777,147	14,552,142	10,897,965	14,868,975
Italy	39,919,353	34,448,881	20,591,452	7,818,358
Netherlands	28,461,035	10,957,780	15,822,985	10,260,642
Norway	6,727,539	4,399,234	4,829,418	.....
Sweden	20,501,179	15,841,218	11,936,021	1,471,525
United Kingdom	369,309,518	239,981,885	141,449,882	19,476,466
Argentina	27,037,129	28,128,606	14,677,466	13,811,492
Brazil	30,443,335	15,360,086	14,165,704	7,613,782
China	8,150,215	2,555,635	1,158,606	29,450
Japan	9,493,616	8,310,841	5,466,597	869,035
Australia	52,704,351	32,597,138	17,663,876	6,504,551
New Zealand	28,417,121	14,781,755	15,402,473	4,224,230
Other countries	202,812,637	151,689,414	427,730,352	68,098,647
Total	1,189,209,092	845,693,830	895,230,643	182,520,489

EXPORTS OF ILLUMINATING OIL

(Figures in gallons.)

	Year 1924	Year 1923	Year 1922	Year 1913
Belgium	31,204,287	29,052,532	24,768,398	58,881,411
Denmark	24,411,806	19,674,036	26,526,053	30,164,209
France	84,213,718	93,822,594	73,105,928	52,963,474
Germany	37,399,776	25,482,035	42,324,706	103,963,882
Italy	27,772,757	25,484,557	17,557,191	21,182,534
Netherlands	70,990,373	61,121,353	80,594,742	134,204,916
Norway	11,296,377	11,946,037	10,004,326	15,027,952
Sweden	16,702,872	16,684,353	14,923,217	28,348,367
United Kingdom	139,515,839	106,757,481	138,474,868	169,288,459
Argentina	13,831,269	12,683,734	12,304,508	21,367,516
Brazil	26,420,264	22,026,619	20,639,460	32,825,176
China	146,201,186	145,523,134	155,426,662	84,471,379
Japan	23,895,448	21,235,092	29,546,154	85,399,913
Australia	23,422,674	23,986,603	15,140,336	19,898,945
New Zealand	4,004,872	3,168,563	5,122,280	5,573,562
Other countries	231,545,361	229,280,731	228,771,522	185,379,031
Total	912,828,889	847,929,454	895,230,641	1,049,396,297

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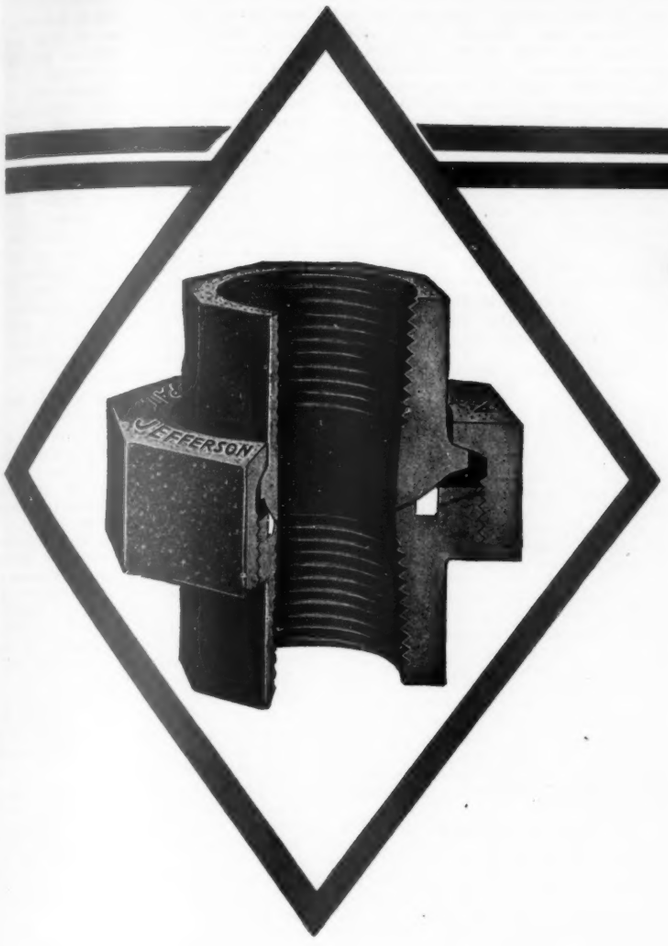

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lons in 1923, making a gain for the year of 19 per cent. Exports of all refined products in 1924 totaled 3,919,538,229 gallons, compared with 3,270,638,102 gallons in 1923, a gain of 20 per cent, while exports of crude oil were 742,134,849 gallons against 716,551,862 gallons, an increase of 3 per cent. These gains for 1924 are particularly significant in view of the considerable increases registered in 1923 over 1922. In 1923 crude oil exports showed an abnormal gain of 70 per cent, while refined product shipments increased 30 per cent; the former being due to California's flush pools and foreign buying of California oil.

Exports by Periods

The following table compares exports of crude and refined products for stated periods:

Total Exports (Figures in Gallons)

	Crude	All Refined Products	Total
1924	742,134,849	3,919,538,229	4,661,673,078
1923	716,551,862	3,270,638,102	3,987,189,964
1922	419,793,896	2,502,871,738	2,922,665,634
1913	196,642,935	1,794,129,778	1,989,772,713

Exports of crude oil go mainly to Canada. During the last two years there have been shipments of California crude to Mexico.

Fifty-one per cent of our total exports of refined products goes to Europe, by far the greatest actual and potential market. In 1924, roundly 854,000,000 gallons of gasoline out of total exports of 1,189,000,000 gallons, or 72 per cent, went to European countries; 105,000,000 gallons, or 8 per cent, were shipped to North American countries, including Canada and Mexico, and to Central America and the West Indies; 85,000,000 gallons, or 7 per cent, to Asia, Dutch East Indies and Oceanica, and 66,000,000 gallons, or 5 per cent, to South American countries. The balance is unclassified in the reports of the Bureau of Foreign and Domestic Commerce.

Our exports of gas and fuel oil totaled 1,438,000,000 gallons. Of this amount 410,000,000 gallons, or 29 per cent, went to North America, Central America and the West Indies; 409,000,000 gallons, or 29 per cent, to Europe; 270,000,000 gallons, or 19 per cent, to Asia, Dutch East Indies and Oceanica, and 252,000,000 gallons, or 17 per cent, to South American countries.

Illuminating oil exports in 1924 totaled lons, or 19 per cent, to TeaEoor..fshrd 913,000,000 gallons, of which 451,000,000 gallons, or 49 per cent, went to European countries; 329,000,000 gallons, or 36 per cent, to Asia, Dutch East Indies and Oceanica; 47,000,000 gallons, or 5 per cent, to South America, and 18,000,000 gallons, or 2 per cent, to North America, Central America and West Indies.

Total exports of lubricating oils were 380,000,000 gallons, of which 267,000,000 gallons, or 70 per cent, went to European countries; 56,000,000 gallons, or 14 per cent, to Asia, Dutch East Indies and Oceanica; 17,000,000 gallons, to North America, Central America and West Indies, and 16,000,000 gallons, or 4 per cent, to South America.

"OIL AND GAS WEEK" PROPOSED FOR APRIL

CHICAGO, Feb. 21.—Plans have been made to set aside the week of April 20-27 to be known as "Oil and Gas Power Week." It is widely felt that one of the benefits will be the indirect combating of propaganda which is being directed increasingly against petroleum as a power source.

The following national, semi-private and Governmental organizations, composed both of scientific and practical authorities are cooperating: American Chemical Society, American Institute of Chemical Engineers, American Institute of Mining and Metallurgical Engineers, American Petroleum Institute, American Society of Marine Designers, American Society of Mechanical Engineers, American Society of Naval Engineers, American Association of Stationary Engineers, National Safety Council, Society of Automotive Engineers, Society of Naval Architects and Marine Engineers, United States Bureau of Mines and the United States Bureau of Standards.

It is expected that all sectional society meetings in that week will be devoted to topics related to the use of oil or gas for power and that, wherever possible, joint meetings of the local sections of the various national organizations will be held. Members of all the organizations listed are invited to participate in all these meetings.

Arrangements are in the hands of a committee consisting of Dr. W. F. Durand, president American Society Mechanical Engineers; Dr. James P. Norris, president American Chemical Society; J. Edgar Pew, president American Petroleum Institute; Dr. Charles F. Lucke, consulting engineer; Prof. W. Trinks, professor mechanical engineering, University of Pittsburgh; L. H. Morison, associate editor, "Power;" William E. Bullock, assistant secretary American Society Mechanical Engineers.

Dr. Durand is chairman and Mr. Bullock secretary of the committee.

It is widely recognized in the oil industry that petroleum as a power agent is being made the target for an ever-increasing amount of adverse criticism from elements whose interests run counter to those of the industry.

The president's appointment recently of the Federal Oil Conservation Board has apparently given these elements a chance to spread what is considered additional harmful information. Leaders in the oil industry, however, say there is nothing in he statements of the President or of the members of the commission to indicate that there will be any curtailment or effort at curtailment of oil for industrial uses. In fact, the ample supply of oil to these uses was given as the primary reason for establishment of the commission.

While no hint of this negative aspect of the plans has been given by the committee in charge, yet it is felt the project will work for unification of all the various interests in connection with oil and gas for power and at the same time, may emphasize the value of the industry to the public.

USE OF BUSES GROWS WITH AMAZING SPEED

NEW YORK, Feb. 21.—Some 12,500 buses and vehicles for bus use were built and placed in service during 1924, states Edward F. Loomis, secretary of the national motor truck committee, National Automobile Chamber of Commerce.

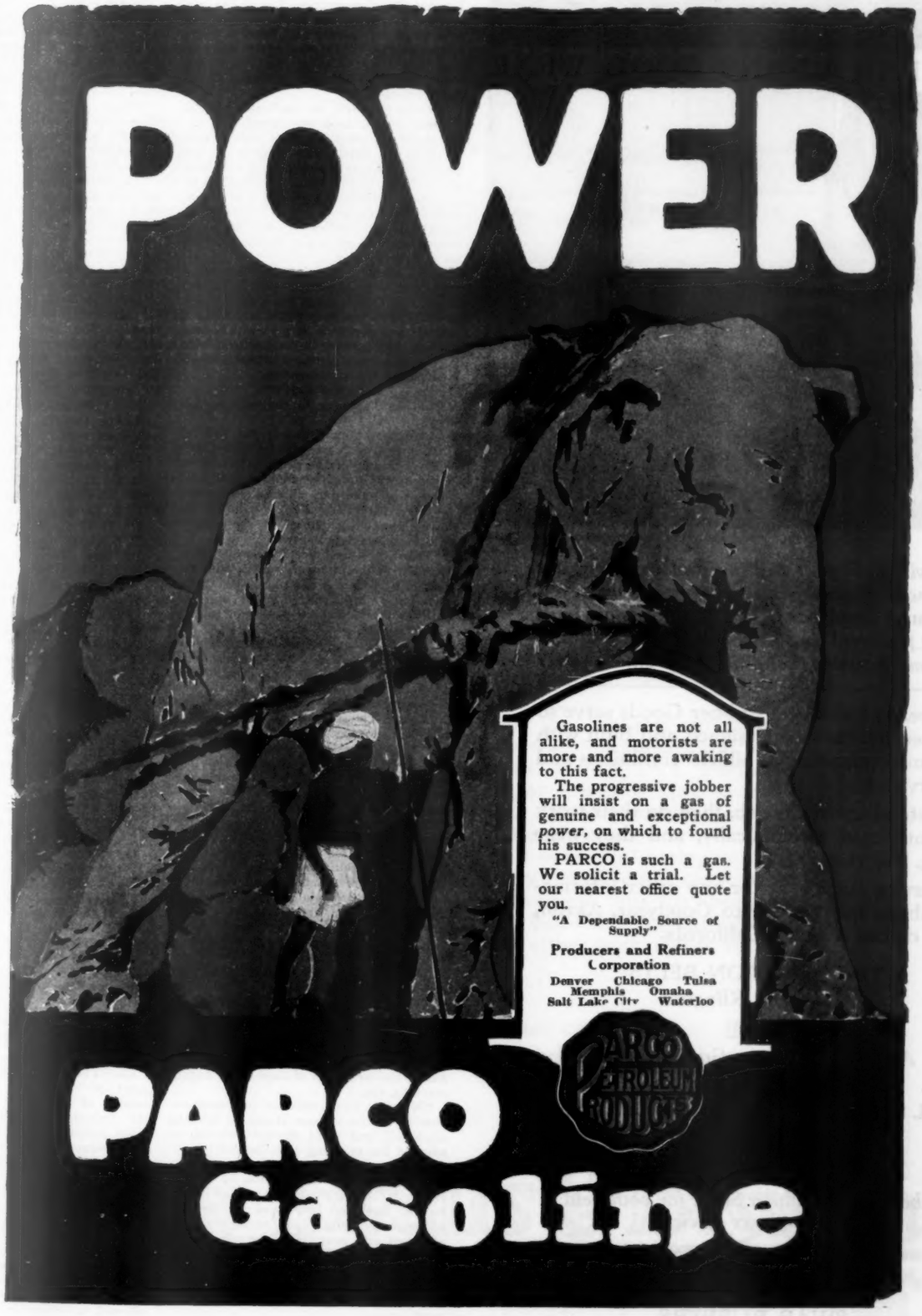
This fact, together with the estimate of 2,500,000,000 pasesngers carried in old and new buses in 1924, indicates, he points out, that the bus is fast assuming a major position in our transportation system.

When added to buses in operation prior to 1924, these new vehicles bring the total number in service in the United States and Canada on January 1, 1925, to 53,000. The gain during 1924 represents approximately 25 per cent of the total now in use. Other figures obtained from bus operators by Bus Transportation forecast a corresponding growth during the present year.

The figures and estimates, based on a survey to which Bus Transportation, the American Electric Railway Association, Electric Railway Journal, and the National Automobile Chamber of Commerce contributed, show the present distribution:

Common carrier independents	31,100
Electric railways	2,000
Hotels	1,000
Schools	15,000
Sightseeing, tourist and contract	1,500
Industrial use, including real estate, department store, apartment house, garage and factory service	1,075
Railroad terminal companies	250
Total	53,925

That the electric railways realize the possibilities of the bus as a transportation medium is attested by the fact that while only 1,200 buses were used in this field on January 1, 1924, no less than 3,000 were used on January 1, 1925, representing an increase of 150 per cent. Three steam railroads are also operating buses in common carrier service through subsidiaries.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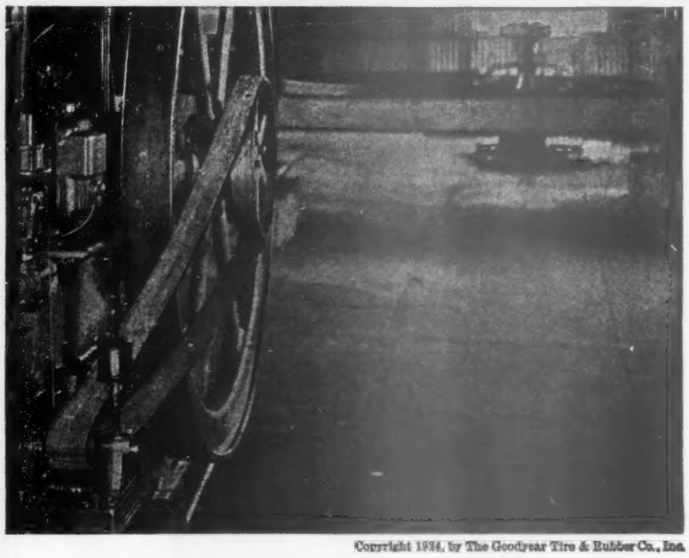

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QUESTIONNAIRE SENT TO REFINERS BY FEDERAL CONSERVATION BOARD

WASHINGTON, D. C., Feb. 21.—In its search for technical information which will aid in stabilizing the industry the Federal Oil Conservation Board has addressed a communication to the leading refiners of the country and asked a series of questions. These deal with efficient distribution of refining plants and the losses sustained in various stages of refining crude oil.

Secretary Work, as chairman of the Federal board, said the board has received information of great value from many of the outstanding men in the industry concerning the most vital problems confronting the oil world. Executives of the big companies, he added, have submitted this datum with frankness and promptness that indicates a willingness to cooperate fully with the Government in its present inquiry.

Many of the executives, the secretary explained, have submitted their individual views, though several of the larger oil organizations of the country, of which these officials are members, at present are conducting independent investigations with a view to submitting data to the Government board for consideration.

Text of Letter

The board's letter to the refiners follows:

"In undertaking its study the Federal Oil Conservation Board realizes the many sided character of the problem before it. Not only the broad economical and legal phase of the question must be considered, but the engineering side of the oil industry demands attention if the subject is to be adequately covered.

"There are technical problems connected with the discovery of oil, with recovery of oil from deep sands, with transportation and refining of crude oil, and finally with efficient utilization of all the products.

"In order to assemble the ideas of men in the industry who have been studying one or several of these problems, letters are being addressed to them asking for their opinions on certain phases of the situation. The information thus obtained may form the basis for conferences later.

Questions Asked

(1) With this brief expression of the board's purpose before you, we would appreciate your views on some of the fundamental phases of petroleum refining.

"(a) What is your opinion as to the existing total refining capacity of the country as related to present and future consumption requirements?

"(b) Are the refining plants efficiently distributed with relation to supply of crude as well as domestic consumption and export requirements?

"(2) It is generally recognized that a certain amount of loss occurs when crude oil is treated in a refinery. Some of this loss is due to evaporation of the crude oil and both finished and unfinished products, some is due to losses in treating with acid or other chemicals, some to the loss of volatile fractions that are not recovered from the vapors from the stills, some is due to the formation of fixed gases during cracking, etc.

"What is your estimate of losses occurring in the various stages of refining crude oil and what methods should be adopted for reducing such losses?

Fuel Consumption

"(3) The fuel consumption at certain refineries is much higher than at others on the basis of barrels of oil treated, although essentially the same processes are used and practically the same products are manufactured. This may be due to differences in distillation equipment such as pipe stills as compared to shell stills, differences in fractionating equipment, etc.

"(a) How can the fuel oil consumption in the average refinery be reduced?

"(b) Can coal be generally substituted for fuel oil to advantage in the refinery?

"(4) At present refiners are much interested in securing a better separation of the various distillates from petroleum. Different types of fractionating equipment have been developed for the purpose of securing cost cuts without the necessity of frequent rerunning.

"What is the possibility of further improvements along this line?

Cracking Probed

"(5) It has been estimated that approximately 30 per cent of the gasoline now produced at refineries is manufactured by cracking heavier oils.

"What are the further possibilities offered by this process of refining, particularly with reference to the manufacture of gasoline from heavy asphaltic oils by means of cracking?

"(6) During the past few years there has been a decided interest in the use of oil for domestic heating. What do you think of this method of utilizing oil and its effects upon refinery practices?

"(7) What are the practical possibilities in reclaiming lubricating oils?

"Any information that you can furnish on other problems relating to the refining of petroleum will be appreciated by the board. The best technical opinion is sought, together with specific suggestions as to ways and means from those qualified to advise this board, and therefore, we urge your full cooperation."

Men Asked for View

Among those to whom the letter was addressed were:

Dr. Sidney Barn, Boynton, Okla.
F. A. Baxter, Rochester, N. Y.
R. D. Bush, San Francisco.
H. W. Camp, Tulsa.
S. E. Campbell, Avon, Cal.
Dr. G. Cash, Witney, Ind.
T. S. Cooke, Casper, Wyo.
Dr. Roy Cross, Kansas City.
Dr. E. W. Dean, New York.
T. S. Delbridge, Philadelphia.
Worthy Exton, Louisville, Ky.
Col. J. H. Graham, Lawrenceville, Ill.
G. W. Gray, New York.
Thomas H. Hilliard, Pittsburgh.
A. S. Hopkins, Neodesha, Kans.
R. R. Irwin, Kansas City.
O. P. Keeney, New York.
H. E. Lord, East Chicago, Ind.
F. T. Manley, Houston.
R. D. Mathews, Woodriver, Ill.
Walter Miller, Ponca City, Okla.
D. W. Moffitt, Tulsa.
J. W. Newton, Beaumont.
R. C. Obsterstrom, Marcus Hook, Pa.
T. F. Ott, Los Angeles.
W. E. Perdew, Wichita, Kan.
Frank C. Read, Baton Rouge, La.
H. B. Setzler, Coffeyville, Kans.
William Slater, Port Arthur, Texas.
Victor H. Smith, El Dorado, Ark.
J. B. Terry, San Francisco.
G. H. Vansenden, Martinez, Cal.
J. M. Wadsworth, Tulsa.
M. P. Yonker, Tulsa.
W. S. Zehrung, Oil City, Pa.
John F. Gray, Chicago.
Howard Bennette, Tulsa.

HELD INFRINGEMENT OF BARNICKEL PATENT

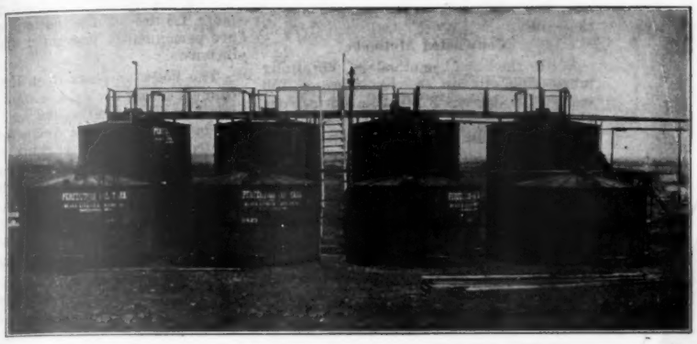
CHEYENNE, Wyo., Feb. 21.—Judgment of $290,895.24 was awarded the estate of William S. Barnickel in the United States District Court here when Judge T. Blake Kennedy ruled that the Producers & Refiners Corp. had been infringing on a compound process of clarifying oil patented by Mr. Barnickel.

Mr. Barnickel, a St. Louis chemist, died in May, 1923, after the litigation had been started.

His process was a treatment for roily oil, water and sediments, commonly known as bottom settlings. Before his discovery all the roily oil was either burned or allowed to collect in fields, where, being inflammable, it was considered a menace.

He had been offered $2,000,000 for his process but decided to keep it after his sixteen years of labor spent in perfecting it. By his will one-third of the income from the patent is divided among 11 associates who stood by him through those years of experiment.

PERFECTION VAPOR PRESSURE TANKS
WOOD, AND BOLTED STEEL TANKS



This battery of Perfection tanks is saving its owner thousands of dollars annually.

No oil well supply company in the country maintains a bigger field service than Black, Sivalls and Bryson. Branch offices are in every active field.

Strength and Safety, Perfection Watchwords

IF you would take the time to inspect the construction of a Perfection Vapor Pressure tank, you would be profoundly impressed by its strength.

You will find it built gas-tight. To prevent the pressure of the vapor from bulging the deck or bottom, it is stayed with heavy braces and gusset plates.

The metal used is a scientific alloy of steel and copper which gives it durability and makes it rust proof. Each tank is made up of sections which when bolted together give it added strength. Every seam is carefully packed and leakage is avoided.

But the features enumerated above are only incidental to the main point: The Perfection Vapor Pressure tank saves all your oil; evaporation is cheated of its daily toll.

This wonderful saving is effected by the gas-tight construction of the tank plus the special relief valve for regulating pressure either from heat or vacuum.

Don't let another summer catch you again unprepared!

Black Sivalls & Bryson
INC.

BARTLESVILLE ~ OKLAHOMA

Branch offices in all principal active fields

For Threading Pipe

The Oster Portable Power Drive

Why have your men run back to the pipe shop to thread your pipe? Take the Oster No. 402 right to the spot where you're putting in the new pipe line, and save them this unnecessary running back and forth.

Two men can carry the machine easily and, best of all, you can hook in to any light socket.

No separate vice necessary. The Power Drive is equipped with its own self-centering chuck. A complete unit in itself.

No. 104½ Bull Dog Die Stock—capacity ¼ to 2″—furnished as standard equipment. An auxiliary shaft for driving geared die stocks increases range to 6″ pipe.

Complete information gladly mailed on request.

OSTER

The Oster Manufacturing Company

Manufacturers of the most complete line of pipe threading equipment in the world.

2089 East 61st Place Cleveland, Ohio

SCHULZE PROCESS FOR MAKING LUBS

(Continued from Page 115)

ing in the still is asphalt. The final distillation temperature should not be allowed to exceed 620 or 630 degrees F. maximum under ordinary conditions. When this is the case, cracking or formation of coky products is entirely avoided. The residue is easily pumped out of the stills.

Contrasted Methods

With the usual method of obtaining lubricating oils up to viscosities of 750 sec. at 100 degrees F., distillation periods above 700 degrees F. are employed. Extensive carcking occurs, of course, producing dark-colored oils which require acid treatment and filtering before they are fit for commercial use. In the Schulze process, lubricating oils with viscosities as high as 150 sec. at 212 degrees F. may be distilled over at 575 to 600 degrees F. and as high as 170 sec. at 212 degrees F. at around 620 degrees F. This latter temperature corresponds approximately to the endpoint of the kerosene cut in ordinary distillation at atmospheric pressure.

The oils produced by Mr. Schulze' process are bright in color and have a remarkably low content of carbon residue. The total sulphur content and percentage of unsaturated compound of the oils are also low and their non-emulsifying properties with both fresh and salt waters are found to be excellent. In short, oils made by this process are high grade lubricants in every way and can be made to suit the wide range of requirements encountered by this class of oils.

Details of Stills and Furnaces

The stills are suspended from overhead supports of structural steel instead of following the ordinary practice of being carried by the brickwork. In this way, the entire weight of the still is carried by the supports, the only weight upon the furnace walls being their own weight. In this way, warping, cracking, buckling and shrinking of the walls is eliminated.

The furnaces are quite different to those ordinarily used. Each is equipped with two burners. These are located one on either side of the furnace instead of being placed in the usual fashion in the center of the face of the furnace where the flame shoots directly into the combustion chamber and inevitably impinges against the fire sheet of the still. The burners direct the oil stream in such a way that the flame is shot out horizontally in the tunnels on each side of the furnace, see Fig. 1. Each of the tunnels known as "dog houses" is 24 by 2 feet and extends almost the entire length of the furnace and still to a baffle about 4 feet in front of the back wall of the furnace proper, forming a combustion chamber in front of the stack opening.

The tops of the tunnels are flat, and are perforated with oblong holes just big enough to be covered by three ordinary fire brick spaced 1 inch apart when placed upon top of it. (See Fig. 2). The flame traversing the tunnel heats the refractory to incandescence and this heat, in turn, is radiated through the holes into the furnace chamber under the still. At no time does the flame strike, nor does it come into contact with the fire sheet of the still. In this simple manner, cracking of the oil and overheating and ultimate failure of the bottom of the still are permanently prevented under all conditions.

The holes or vents upon the top of the tunnels also provide a means of regulating furnace operation as well as of producing more uniform temperature and a protection against cracking of the still contents. The holes in the top of a tunnel can be varied in area by changing the space between bricks so as to obtain the most suitable draft conditions. Further control is obtained by the stack damper.

Features of the Furnace

The furnace design marks a radical step in the refining industry and one which, if results obtained during the past six months are any criterion, constitutes a pronounced forward step. The use of fire brick has been omitted altogether. Instead, each furnace is lined entirely with a monolithic plastic refractory which offers a one-piece lining from 5 to 8 inches in thickness. The first cost of this lining is somewhat higher than ordinary brick work. But it gave promise of having longer life, as well as being able to stand up under service conditions longer without patching or repair, so that it was felt the ultimate cost would be much lower than brick. To date, this has proved to be the case; and, so far, not a penny has been spent for repairs. The joints between bricks are inherently a source of weakness and it was thought that since the monolithic lining eliminated all joints, the furnace life would be correspondingly increased. This has been the case. In fact, it has been found that all the usual difficulties due to bricks working loose, spawling, falling out and cracking have disappeared completely.

The plastic furnace lining is pounded into place against the common brick after having been made of right size to be easily handled. The lining is about 8 inches in thickness at the bottom and from 4 to 5 inches at the top of the furnace, depending upon the location. The lining is securely anchored to the brick work by the removal of common brick at convenient locations, about 3 feet apart. The one-piece mass of refractory forming the furnace lining eliminate all joints. Because of its smooth surface, there are no weaknesses where trouble can start.

Advantages Cited

Speaking about his experience with this plastic refractory, R. S. Watt, treasurer of the company and in direct charge of the plant, says: "We tried out some of this material two years ago to repair

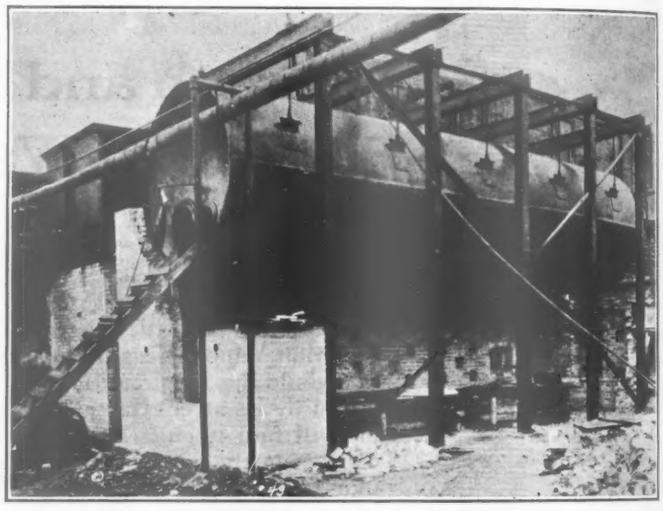


Figure 4: Exterior view showing 9 by 30-foot still at the Red River Refining Co.'s plant in course of construction.

A SPLENDID LINE of LUBES

We offer:

Pale and Red Oils in viscosities ranging from 200 to 2000 inclusive, and manufactured in our very modern refinery.

Our Lubes are made from highest grade Selected Crude.

Owning a complete line of tank cars, quick delivery can be made in cars of different capacities or in cars of two or three compartments.

Inquiries are earnestly solicited and we assure you, the promptest consideration, highest type of efficient service, and a genuine appreciation of any opportunities afforded us.

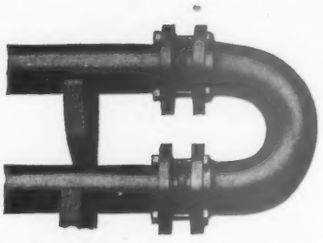
Samples, prices and specifications gladly furnished on request.

ELLIOTT JONES & CO. INC.

REFINERS OF PETROLEUM

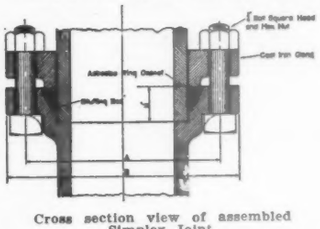
SAN ANTONIO, TEXAS

No More Flanged Pipe for Condenser Coils



Simplex return-bend mounted on plain-end pipe, with gaskets, glands and bolts ready for adjustment.

"ONE FLANGE IS LOOSE"



Cross section view of assembled Simplex Joint.

Progressive refineries secure the durability of cast iron pipe in their condenser coils without the disadvantage of flanged pipe construction. Simplex is cast iron and therefore resists corrosion.

The Simplex Joint can be assembled with the pipe at any angle. The movable gland (or loose flange) and the bulky gasket allow deflection and at the same time insure a tight joint. The asbestos ring gasket is made in one piece.

When desired, this material is furnished with a split cast iron ring in a groove at the plain end, which absolutely locks the joint together.

Let us send you names of users and prices on this economical type of condenser coil construction.

Write for Simplex Condenser Catalog Number 50

AMERICAN CAST IRON PIPE COMPANY

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Do you know why cast iron resists rust so much more than other ferrous metals? Our Bulletin No. 34 explains it.

some arches that were continually falling down and the results obtained solved our problem. We then tried it out to repair a boiler wall and it was so satisfactory that after one year we decided to equip our entire plant with this material. Today all our stills and boilers are lined with this material and we feel that our furnace troubles are over. The initial cost is greater but the upkeep is nothing. We have not had a bricklayer on the job since abandoning fire brick and our walls and arches to all appearance are as good today as when they were installed."

Fuel consumption has been reduced because the thick monolithic one-piece lining constitutes an impervious furnace wall through which air infiltration cannot make its way. This not only means lower fuel consumption, but closer temperature control and longer furnace life, because expansion and contraction have been lessened. Another fact in favor of the plastic refractory was that it eliminated the need for all special shapes in bricks, which are costly to buy and which necessitates extreme care in handling, because they are fragile and readily damaged if exposed to the elements. While this was not a particularly important matter in the case of the Burnham plant, located outside of Chicago, it is an extremely important one in many localities where the refinery is far-removed from sources of supply, where rough travel, high transportation charges and delays in delivery are inherent to the situation. In fact, this was one of the factors that led to the trying out of this plastic lining, to ascertain whether it stood up in service since, if so, it marked a new forward step in furnace maintenance which would be employed in all refineries subsequently using the Schulze process and apparatus.

The writer wishes to express his appreciation to John E. Schulze and R. S. Watt of the Red River Refining Co., for their courtesy and kind cooperation in allowing him free access to their plant; and to the Plibrico Jointless Fire Brick Co., Chicago, which furnished him with drawings of the furnaces as well as with a demonstration of the application of Plibrico Furnace Lining.

FRACTIONATION AND TOWER DESIGN

(Continued from Page 86)

ing crude as illustrated by the use of a "vapor heat exchanger." The vapors are ultimately condensed in the water cooled condensers.

Very seldom was a direct reflux medium used for an absorbing factor in the fractional distillation. To further substantiate the efficient results, attention is called to Still No. 4, in Plate I, and the condensate of the lower condenser which meets specifications for 38°-40° stove distillate. In the next tower above, the condensate meets specifications for kerosene of 40°-42° gravity.

Use of Second Tower

The use of the second upper tower was for the purpose of separating the elements of the volatile hydrocarbons, which contained naphtha. This was necessary due to a variation in kerosene specifications ranging from 135° flash to 170° flash, which means an initial boiling point for kerosene of 336° and 410° respectively. This was controlled by towers H and B used in conjunction with still No. 4, running to 220-24° gravity fuel oil. The effective separation of the fractionating equipment is designated by the classification of products from each tower. Diagram No. 11 shows the operation of the battery with changes as noted. The plant conditions necessitated this operation, and the effective separation of the hydrocarbons was realized by conforming to technical application of the law of "Heat and Matter." The rate of heat exchange, for respective, effective operation of the hydrocarbons was variable as to the content of cubical volume of vapors and steam, traversing the system. As the tube condenser contained only 180 square feet of surface contact, the rate of exchange was controlled by the increase or decrease of the indirect cooling medium to effect the condensation of the volatile elements required for specifications. This, however, was only necessary in tower No. 4, as the volume of steam and vapor to condensation in the other towers was performed in the usual manner with no differential regulation of the indirect cooling medium.

Therefore, the attainment of effective fractionation is realized by the application of the law of "Heat and Matter" and the recovery of products meeting specifications is assured.

To effect similar fractionation in any other battery of stills would require seven stills. The efficiency of the battery, effecting this result is ultimately increased due to less operating costs involved.

The following data are evidence of the efficiency of the process:

Fuel consumption, 2.5 per cent per barrel charged per day.

Water used per gallons distilled, 2.1 gallons.

Temperature crude entering evaporator, 350 degrees Fahrenheit.

Saving of 5.5 pounds of fuel oil per 1,000 pounds oil distilled per hour.

Steam consumption—600 lbs. used per hour per still, running 3,500 bbls. per day.

The costs of tile packed towers with tube condensers, for each still, omitting any other equipment, will average $2,600 for each tower.

PERSONNEL DEPARTMENT IS IMPORTANT FACTOR

(Continued from Page 94)

as high as a house. Breeding of all sorts of dogs, raising of fine fruits, weaving rugs, making musical instruments, have all come into play as a hobby for some man, to help divert his mind from his work.

Benefit of Hobbies

Hobbies, when used within the bounds of reason, are the most economical and satisfying diversions. The beauty about them, aside from their recreational value, is that they are constructive and each an appreciation of other peoples' accomplishments and efforts. Of all the things which help get mens' minds made up to become property owners, probably none is more potential than a good common sense hobby.

Abut 45 per cent of all workers in America are home owners. When less than this number own their homes, there is a danger of having unstable employes. It is said by some that when more than 45 per cent own their homes, fluctuations in labor requirements create hardship by throwing property owners out of employment and so requiring them to wait for better times in their own community, rent their house with the attendant difficulties, or dispose of their property quickly and usually at a disadvantage. In most cases, arguments against home ownership are effective devices for keeping folks from becoming independent. While there is a limit to the price a workman can afford to pay for a home, yet there are few who cannot pay for a home once they have made up their minds to try.

It is generally admitted that home owners are, as a class, more satisfactory workman than renters. Consequently, many companies have gone to considerable trouble to assist their men in getting into homes of their own.

In closing, to sum up the answer as to the "Why of the Personnel Department?" Personnel work is done for the purpose of building and maintaining a good organization, which will properly do the work assigned to it. A department is established to do the work in order that it may be done in a central place, in accordance with the wishes of the chief executive, but without the necessity for his personal attention to the details of its performance.

NOW IN MID-CONTINENT

H. M. Haseltine, formerly with the Guiberson Corp. in Texas, is now connected with that concern in Oklahoma and Kansas, making his headquarters in Tulsa.

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As is usual TEXHOMA will be
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Western Petroleum Refiners Association

Meeting March 3-4-5 at Kansas City

We hope to see everyone

Renew old acquaintances

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Diesel Fuels	Axle Greases
Signal Oils	Wire Rope Lubricants
Miners Oil	Pale Oils
Gas Oil	Red Oils
Distillates	Black Oils
Spindle Oils	Floor Oils
Motor Oils	Waxes
Engine Oils	Asphalts
Dynamo Oils	Road Oils
Machine Oils	Asphalt Cement
Cylinder Oils	Pipe Coating
Cylinder Stocks	Roofing
Car Oils	Roofing Paper
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MODERN PROCESSES FOR TREATING OIL

(Continued from Page 96)

Another continuous treating system consists in a series of tanks, taller than wide, each about half full of the chemical solution which is to act on the oil. The oil is pumped into the bottom and escapes out of a perforated pipe and so bubbles up through the chemical solution. The latter remains in the tank, but the oil passes out through a pipe at the top, thence down to the bottom of the next tank and so on. Tanks of wash water may be interposed between successive chemical tanks if desired. If sulphur is to be added one of the tanks may be partly filled with large lumps of sulphur, some of which dissolves in the oil to effect the precipitation of the coloring matter resulting from the action of the doctor solution. However, an excess of sulphur is liable to be introduced into the oil by this method, and it is accordingly not a desirable way.

In addition to the processes described above various other processes have been made use of in certain circumstances; for example, oils that contain hydrogen sulphide can very advantageously be washed with caustic soda solution before any other treating process is applied, to remove this deleterious gas.

Treatment of Pressure Products

It has been found that chemical treatment of the finished distillate from the cracking process produces products that are discolored, gum producing, and otherwise objectionable and, therefore, it has been the practice heretofore to treat the pressure distillate and then to distill this treated pressure distillate for the production of gasoline and naphtha, and then not to treat these final distillates. Among the bad effects of the treatment of pressure products with sulphuric acid is the raising of the end point in the distillation test from 5 to 10 points or more.

The treating processes used on the pressure distillate are practically identical with those described above for treating the straight run gasoline and naphtha, namely, acid treat, and for this purpose previously used sludge acid is sometimes used, followed by a doctor treat, and in this case the sulphur may be omitted since the discoloration of the oil is no disadvantage because the distillate made from it will nevertheless be of good color. Hypochlorite may be used instead of the doctor solution.

A strong caustic soda wash may be given before the acid if the oil contains hydrogen sulphide.

Kerosene and Burning Oils

For most kerosene distillates it is sufficient to treat them with sulphuric acid, from one to three pounds per barrel, but if there is a large amount of sulpuhur in the kerosene distillate, such distillates, for example as are obtained from Mexican crude, large amounts of sulphuric acid, even up to 30 pounds per barrel, may be required and long agitation with the acid.

After the acid treatment and the settlement of the sludge the kerosene is neutralized with dilute caustic soda after which it is dropped to the bleachers to settle. If the kerosene does not settle rapidly, say in 10 to 12 hours, a small amount of fine (100-200 mesh) Fuller's earth sprinkled into the oil will cause it to settle bright very rapidly.

In the case of burning oils made from crudes which contain high percentages of olefines or aromatic compounds it may be necessary to treat the kerosene distillate by the Edeleanu process. This process consists in extracting the distillate with liquid sulphur dioxide at a temperature below the boiling point of the latter (14 degrees Fahrenheit). The sulphur dioxide dissolves the unsaturated, and especially the aromatic compounds and forms a heavy layer under the purified kerosene. The supernatant kerosene is drawn off and neutralized with caustic soda and the heavy solution of unsaturated and aromatic hydrocarbons in the sulphur dioxide is subjected to distillation so as to remove the sulphur dioxide which is then compressed, cooled and condensed to be used over again, leaving the hydrocarbons in the still.

Sometimes kerosene is also required to be sweet to the doctor, in which case it is subjected to the doctor solution in the same manner as described above for gasoline.

Frequently the acid treatment is omitted, and only the doctor treatment given. A product so made, however, is liable to become dark colored with time, especially in warm weather.

Lubricating Oils

There are two general classes of lubricating oils whose method of treatment differ somewhat. These classes are (a) overhead distilled lubricating oils, and (b) residual oils or so-called stocks. These will be dealt with separately in this article.

Distilled Lubricating Oils

In the case of straight paraffin base oils such as those from Pennsylvania crude, acid treatment is rarely given. The oil is simply filtered through granular Fuller's earth and therefore little needs to be said about these oils here.

In the case of oils made from the so-called mixed base crude oils, that is, those crude oils which contain both asphalt and paraffin wax, the lubricating oils after being distilled are reduced to the proper viscosity, and in most cases it is then treated with sulphuric acid in amounts varying from 3 to 15 pounds per barrel. After this treatment and after the sludge acid has been settled and removed, the oil may be neutralized with a solution of caustic soda, soda ash, or ammonia water, depending upon which will emulsify the least. Sometimes a concentrated caustic soda solution will emulsify less than a dilute one and sometimes it is the other way, depending upon the particular characteristic of the crude from which the oil is derived and the exact manner in which the oil has been treated with acid.

Many highly asphaltic oils, such as South Texas overhead lubricating distillates, frequently exhibit a great color instability after they have been treated. In order to overcome this defect the oils may be distilled from a solution of caustic soda. The procedure in such a case is commonly as follows:

About 2 per cent of 20 Be. caustic soda is introduced with the oil into the still. The mass is warmed to about 200-210 degrees Fahrenheit, while air is blown through to agitate the mass and to evaporate the water. After the water has all been driven out, the air stream is stopped and the fire is increased and the distillation is proceeded with in the usual manner, using an abundance of steam. This procedure also greatly helps the odor of the oil. The distillate thus obtained may now be treated with acid, as above described and neutralized and, if desired, also filtered through Fuller's earth.

In some cases, however, it is better to acid treat the raw distillate, which has been obtained from the crude oil, before this so-treated distillate is redistilled with caustic soda.

Temperature Higher

The temperature necessary for the treating of lubricating oils with sulphuric acid is somewhat higher than that which is best for light oils. Nevertheless, if very high temperatures are used the oil will become discolored and such discoloration cannot be removed by subsequent retreatment.

If the lubricating oils are made from high sulphurous crudes a preliminary wash with a solution of caustic soda may be highly advantageous for the purpose of removing the hydrogen sulphide.

If the oil has been acid treated and the sludge has been thoroughly settled out of it, the oil may be filtered through granular Fuller's earth in the acid condition or it may be neutralized and then filtered. Until recently it has been the common practice to neutralize and then filter, but it has been found that better yields may be obtained by filtering the oil in the acid condition; and this latter procedure has been in use in at least one refinery for over 10 years.

Instead of percolating the treated oil through granular Fuller's earth, the oil

(Continued on Page 180)

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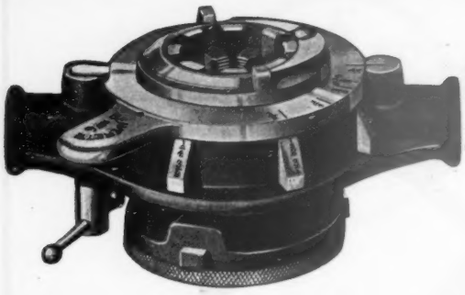
ANY SIZE—ANY PLACE—ANY PURPOSE

The WARREN CITY
TANK & BOILER Co
WARREN, OHIO



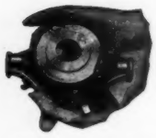
No. 6

BEAVERETTE

¼, ⅜, ½ and ¾" with the same set of dies and bushings.

Shift the Dial Plate—That's All

Set the Dial—That's All



Universal Chuck—No Bushings

CONTRAST a simple shift of the dial plate on Beaverette, to get ready to thread a different size pipe, with the troublesome way of hunting for or changing loose dies or bushings.

Beaverette threads all sizes without changing dies or bushings. When you set the dial plate to size it's ready—and the universal centering device avoids loose bushings.

Complete within itself—no loose parts—cuts a thread in the time it takes to change dies in other tools.

It's all there when you want it.

Buy it through your jobber.

Ask for complete Beaver catalog of 18 Beavers ⅛ to 12 inches.

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A positive displacement, oscillating piston design, never equaled for *lasting* accuracy.

The EMPIRE

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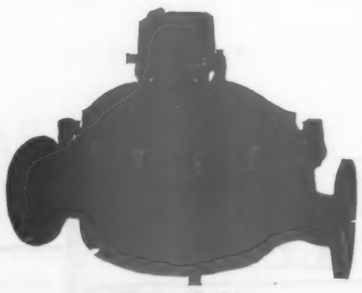

Empire Oil Meter
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PIPE INDUSTRY CLOSE TO CAPACITY; OIL COUNTRY ORDERS INCREASING

By B. E. V. Luty

PITTSBURGH, Pa., Feb. 23.—The large amount of line pipe business lately placed summarized in last report as totaling 150,000 tons, has put the pipe mills as a whole in very good operating condition. The National Tube Co. has been running at a lower rate than the independents, as a class, but booked by far the majority of this business and is now running well, putting the Riverside plant, in the Wheeling district, in operation again. This is a sort of emergency plant, operated only when there is particularly heavy pressure for tonnage. The pipe industry is now running at close to capacity, say at 85 to 90 per cent.

Orders for oil country goods continue to increase somewhat from week to week. The bookings are not particularly large in general but are rather large for this time of year, as it is still somewhat off season for oil country goods.

Buying of merchant pipe is of fair proportions. It is not as heavy as some of the mills would like but is probably all that could be expected. Pipe mills are in the habit of expecting jobbers to stock up in merchant pipe at this time of year, and that the jobbers are not doing. That is, they are not building up stocks beyond a normal, their policy being simply to keep a good assortment, sufficient to take care of their business, and they are ordering in small lots at frequent intervals, to replenish.

Iron and Steel Market

In the iron and steel market in general there is a pronounced dullness, regarded in some quarters as an oppressive dull ness. Since the dullness is seen in almost all lines of trade and is not attributed to any particularly unfavorable developments, it may be considered psychological, a reaction from the enthusiasm that developed after the election and led men to take an extremely sanguine view of the future of business. There was talk of there being a "boom" and of the dangers of inflation. The dullness is a perfect preventative of boom and inflation but not much comfort seems to be taken by the trade from reflecting on this fact.

Operation of the steel industry as a whole has probably decreased somewhat in the past fortnight. There are many plants reported to be running as well as formerly, but there are other cases of decreases, and as the steel industry was operating at close to capacity late in January and early in February there can hardly have been any increase that would offset the decreases now reported. In particular, the independent steel mills in the Youngstown district are reported as having averaged a 70 per cent operation last week, when at one time they were doing about 90 per cent. The Steel Corporation mills in the Youngstown district are reported running as well as ever.

Consumption Heavy

Quite a while ago the steel industry became well booked with business to April 1, and some additional business has since been booked, so that it has a fair amount of momentum to carry it through this dull period, if the period does not last very long. January showed heavy steel production, only three months in the past, April and May of 1923 and February will do approximately as well, March of 1924 having had a higher rate, possibly a little better, but more likely a little less, and it looks as if March would show a definite recession, but there is no likelihood of the steep decline that occurred last year, after the peak month of March. There may be a revival in activity such as to put production on the up grade again within a few months. The chief point is that there has been heavy production while jobbers and manufacturing consumers were replenishing stocks. Consumption is heavy and is probably trending upward even now.

Finished steel prices are unchanged, but some prices as recently advanced have not been seriously tested and may not hold.

The pig iron market is very dull, there being little current business for spot or prompt shipment and no disposition to contract for the second quarter. Prices are unchanged except that Bessemer iron is offered 50 cents lower, being now quotable at $22.50 to $23, with basic remaining nominal at $22 and foundry at $22 to $23, al lprices being f.o.b valley furnaces.

Connellsville coke has weakened slightly, production not having been curtailed enough.

KENTUCKY-TENNESSEE

(Continued from Page 56)

feet with 40 quarts of nitro. The rig has been moved to the adjoining lease and drilling will be commenced about the middle of the week.

Tichner and others' No. 1 Potter, in the Chaney-Jenkins-Vaughn area, to the south of the Richpond Pool, was dry and abandoned at 490 feet.

Cumberland County

W. S. Raydure's No. 2 Coop, on Sulphur Creek, is reported as flowing 35 bbls. per hour from a sand found at 220 feet below the Pencil Cave. At 260 feet below the well made 100 bbls. daily.

At Kettle Creek, Coe and others' No. 1 M. Scott was abandoned at 140 feet below the Pencil Cave. The Dayton Oil Syndicate's No. 4 Kim Crawford has been abandoned for the present at about 50 feet below the cave, according to reports.

Eastern Division

The North Weir Field of Lawrence and Johnson Counties furnished the best wells during the past week in the eastern division of the Blue Grass State. In the northern extension of the Martha Field, the Union Gas & Oil Co.'s No. 2 Caney Sparks started off at 40 bbls. from the Weir sand at an approximate depth of 690 feet; No. 6 C. K. Dobyne, district No. 22, showed for 60 bbls., its first pumping from the Weir sand.

The Union Gas & Oil Co. is now drilling but four wells on its properties in the North Weir Field. No. 1 C. E. Frailey, drilling in lime; No. 30 P. P. Holbrook, drilling in lime; No. 3 Mary Ferguson, drilling in lime; No. 7 C. K. Dobyne, No. 1 farm, rigging up.

In district No. 22, Garrison & Townsend finished their fifteenth straight producer on its C. K. Dobyne farm for 25 bbls. from the Weir sand.

In district No. 32, the Cumberland Petroleum Co.'s No. 3 J. J. Skaggs is pumping 7 bbls. from the Weir sand.

Johnson-Magoffin Counties

In the South Weir Field, Oliver & Jenkins got a 6-bbl. pumper in their No. 5 W. P. Adams from the Weir sand. The lease is in district No. 29.

The wildcat on the J. J. Howard farm, drilled by the Petroleum Exploration, at the head of Licking River, near the Knott County line, in Magoffin County, is registered as a failure at 2,100 feet.

Lee-Owsley Counties

In district No. 35 of Lee and Owsley Counties, Hupp & Duff are credited with a 20-bbl. pumper in their No. 5 on the Adaline Porter; the Petroleum Co.'s No. 3 Gourley-Redman-McGuire tested 8 bbls. at 1,200 feet; Coombs Brothers made a 15-bbl. strike in No. 4 on the A. J. Combs lease.

Dulin and others' wildcat in the Little Sexton Creek district of Owsley County was a disappointment at 1,132 feet.

Other Completions

Wayne County: Spradlin & Marsh's No. 3 Bridgman, Susie district, 5 bbls. in the Beaver sand.

In Wolfe County, the Kentucky Star Oil Co. finished No. 2 Spencer heirs, district No. 20, for 5 bbls.

The Eastern Carbon Black Co.'s No. 1 Roy McCornice, in Floyd County and the Carter Oil Co.'s No. 1 on the Federal Coal Lands, 9 miles from Kermit, in Martin County, are both small gas wells.

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M439

Use of Seismograph And Torsion Balance Provokes Curiosity

By Charles E. Kern

WASHINGTON, D. C., Feb. 23.—The seismograph and the torsion balance used in locating oil structure have frequently been the subjects of inquiry by oil companies. A typical letter seeking this information was recently received by the writer and a statement concerning about all that is known of these instruments by the United States Geological Survey was obtained. The letter seeking this information follows:

"We have read your articles in The Oil and Gas Journal about the use of the seismograph and the torsion balance in locating structures. We understand, in a general way, the principles on which these instruments operate, but we wish specific information on the types of instruments, the companies producing them, and prices for leasing or for buying. Are there any seismographs for oil finding made in the United States? What companies in Germany produce these and what are their charges? We understand that the following companies have used the seismograph in the United States: Gulf Oil Corp., Pathfinder Oil Co., Marland Oil Co., Roxana Oil Corp. Do you know what machines these companies have used, how many they are operating and whether any of these companies own their own machines or whether they are leased from Germany and operated by a German? Do you consider the seismograph better fitted for determining structure than the torsion balance? What are its advantages and disadvantages as compared with the torsion balance?

The answer of the Geological Survey to the foregoing questions follows:

"The survey can furnish only very incomplete information regarding the construction, manufacture and cost of the Eotves Torsion Balance and the seismic apparatus which were developed in Germany and are used by some American oil companies. You will find descriptions of the construction of the Eotvos balance, with discussion of its principles of operation, in the following journals:

Economic Geology, Vol. XVIII, No. 7, October-November, 1923, page 639;

Engineering and Mining Journal-Press, Vol. 118, No. 2, page 54, July 12, 1924.

"So far as the Geological Survey is informed, the Torsion Balance used by American oil companies are all imported from the manufacturers in Budapest, Hungary and Berlin. I understand that an instrument possibly differing little from the Budapest model is manufactured at Heidelberg, Germany. The Berlin instrument is somewhat more expensive than the Budapest model, on account, perhaps of the device for automatic photographic record of the torsional deflection. It is correspondingly more complex and may, therefore, more easily get out of order.

"The Torsion Balance equipment is sold, I believe, to Americans for $15,000 or $18,000. However, I have no reliable authority for quoting any price. Let me suggest that to secure prices, as well as the addresses of the makers, you write or cable the American Consul in Budapest and the Consul-General in Berlin.

"The seismic apparatus used in this country is, I believe, that manufactured by the Seismos Gesellschaft, of Hanover, I can not quote prices.

"It is my understanding that the seismic apparatus used on the Gulf Coast by the American oil companies were all brought over with German operators and used by the latter under contract. I am not sure that any American has yet purchased the equipment and undertaken its use without German assistants. The contract method is expensive, but as for that matter it is likely that any employment of seismic methods will for a long time be expensive on account of the great amount of basic information, covering such matters as densities of the different strata involved and the rate and direction of the wave through them, which must be slowly acquired in great ultimate volume to secure satisfactory results.

"Both methods seem to be particularly adapted to use in the unconsolidated Pleistocene and late Tertiary rocks of light density surrounding the salt plugs in the marginal belt of the Gulf Coastal Plain.

"The companies using either of the above methods have generally been secretive, not only as to the results and costs, but as to the fact that the methods were used by them. It is generally reported that the Gulf Corp. has used seismic methods and I have been told that the Marland Oil Co. has had experimental trials of the same apparatus. The Amerada Petroleum Corp. is reported to have used the torsion balance.

"It is probable that some of the torsion balances used in this country have been purchased by the oil companies using them.

"The survey has no direct observation information as to the superiority of the results reached in the use of their type of equipment in a given area. I have heard it stated that the seismic method was better in the sale dome belt. On the other hand, it would seem that the torsion balance was particularly well suited to salt dome discovery, or at least for the definition of the dome when it is approximately located. As to the application in other regions, such, for example, as the Mid-Continent region, the survey has no definite information on which to base a statement as to the relative merits."

NEW LOADING METHOD FOR STORAGE TANKS

An original method of loading large oil storage tanks has been devised by the Wayne Tank & Pump Co., of Fort Wayne, Ind. The first shipment on which the new loading methods were employed has been sent through from Fort Wayne to the Beresford Co-operative Oil Co., at Beresford, S. D., arriving in "first-class shape," according to the manager of the company. The unique feature of the shipment was the fact that three tanks, each of which would ordinarily require one flatcar, were loaded on two cars. E. J. Lennart, traffic manager of the Wayne Co., devised the loading method.

Mr. Lennart explains the loading as follows: "The 15,000-gallon tank is about 31 feet long, and the 10,000-gallon tank is about 22 feet long. Since the longest flat we could possibly get is but 50 feet, it was evident we could not load two of these tanks on one car. After considerable study it was decided we use a 42½-foot flat car and a 40-foot flat car. A 15,000-gallon tank was loaded on each one of the flats and a 10,000-gallon tank was saddled onto the 42½-footflat and securely tied down. One end of the tank was permitted to swing over the other flat, from 6 to 8 inches above it. The three tanks made a long journey without any trouble and arrived at destination in perfect condition. Transportation charges on the three tanks were but little more than would have accrued had only two tanks been shipped.

"The peculiar feature about the loading of these tanks was that there was no rule covering their loading. The mechanical division of the American Railway Association has devised certain rules and regulations which must be followed in loading material of unusual length or bulk. Practically every article conceivable is covered with the exception of tanks. We had two or three conferences with car inspection divisions of three railroads and the carriers finally agreed to accept the tanks as we loaded them. Such acceptance was necessary because it is a hard and fast rule of the American Railway Association that when matters such as this come up and which apparently are not covered by the rules, cars must be refused until the proper authority is received to accept them. While if any of the connecting or delivering lines find no provisions for accepting such a load, they would refuse it for handling over their rails."

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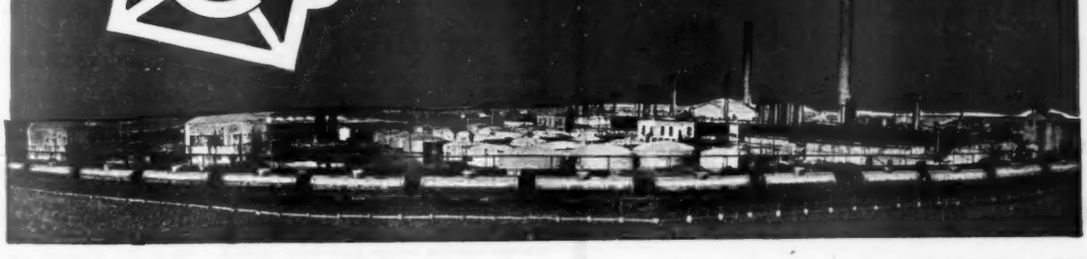

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CRUDE PRICE ADVANCE SHOWS PRODUCTION NEED

(Continued from Page 98)

The following table shows the enormous requirements of single companies operating in the United States, including only their plants having a daily capacity of 50,000 bbls. or more, according to the United States Bureau of Mines report as of November 1, 1924:

Company—	No. Plants	Daily Capacity	Annual Capacity
Standard of Calif..	2	200,000	73,000,000
Standard of N. J..	1	180,000	65,700,000
Gulf Refining	1	102,000	37,230,000
The Texas Co.	3	80,000	29,200,000
Standard of La. ..	1	60,000	21,900,000
Cosden & Co.	1	50,000	18,250,000
General Petroleum..	1	50,000	18,250,000
Atlantic Refining ..	1	50,000	18,250,000
Midwest Refining .	1	50,000	18,250,000
Total	12	822,000	300,030,000

Must Look Ahead

Here are 12 complete refineries having a capacity of 822,000 bbls. daily, or 300,030,000 bbls. of crude a year. Naturally those having the responsibility of assuring a supply of crude to these plants must look ahead, as well as care for current requirements. Incidentally the above plants operated at capacity would consume more than 42 per cent of the current domestic production of crude oil.

The annual crude oil requirements of the Standard Oil Co. of New Jersey, Standard Oil Co. of California, Standard Oil Co. of Indiana and Standard Oil Co. of New York, and subsidiaries, combined, are estimated at 277,684,000 bbls., based on capacity of their domestic refineries alone.

The situation of these concerns with regard to crude oil is indicated by the fact that each one has spent millions of dollars in the past few years in the purchase and development of foreign concessions. Much of this money was spent at a time when the supply of oil from domestic fields was far beyond requirements, and when as a result prices of crude petroleum were the lowest since 1916 or 1917. It is also worthy of mention that a certain proportion of these expenditures resulted in a total loss, so far as the finding of petroleum was concerned.

Effect of Price Increases

Naturally the big operators realized that the effect of the recent price increases would be that of increasing drilling, including wildcatting. They also realized that new fields might be discovered in the United States which would bring a new flood of production and a decline in prices. There are many prospective producing areas in Texas and other States which have not yet been tapped. However, the price increases will, they believe, serve to bring out such production if it exists, and if it does not materialize, the fact will become known that the United States must begin to look to foreign fields for a considerably larger percentage of its needs than it does at present. In six to eight months, the results of these price increases will be generally known.

The November, 1924, report of the Bureau of Mines places total oil refining capacity of the United States at 2,832,532 bbls. daily, or 1,033,854,180 bbls. a year. This figure shows that in the event of consumption necessitating capacity operation of all plants, 300,000,000 bbls. would have to be imported unless domestic production could be increased beyond its present average. It is not beyond probability that price increases this year were for the purpose of bringing out this additional production, either in the United States or abroad.

Need of Higher Prices

Price increases of the last six weeks have been due not only to the apparent need for stimulating production, but doubtless a consideration has been the need on the part of the oil industry to sell its products at a price to cover the storage charges which have been mounting since 1918. It is estimated that the cost per barrel of oil now available in storage averages at least $2.50 to $3, including cost of production, or price paid at well, gathering charges, storage, evaporation and the numerous other charges connected with handling and storing it. This figure, if anywhere near correct, as it is believed to be, seems to justify prices now paid for current output by companies also having large stocks on hand which they have carried for several years.

The calculation referred to calls further attention to the question of the advisability of recent price increases. If these advances bring a new flood of output this year and continued adding to storage, the charges connected with storage will mount so that ultimately it will take a higher return than at present to pay for them, to say nothing of the strain on the industry which continued storing will entail. This all goes to indicate that leaders in the industry would decry price increases which would insure another year of overproduction.

That the oil business is desirous of getting excessive prices for crude oil or its products even though it could do so is refuted by the fact that excessive prices would doubtless increase competition and develop production to a point where a corresponding slump would occur. In the end, therefore, the industry would get a price averaging no higher than if it were to advance prices moderately, with only a moderate recession later on. That cycles are bound to occur in prices and production is proved by the history of the oil business since 1859.

If no new production is developed during the next few weeks the belief in this section of the country is that prices will go higher, and will advance until the rise in output materializes, or the shortage is made up by means of increased imports. It is said that production is already available in Venezuela and Peru, among other countries, for shipment to the United States in fairly large quantities. However, it will be another year before much oil can be exported from such countries as Colombia, where development is under way.

Meanwhile, it is said that leading oil men are actually counting upon an increase in domestic production large enough to make the drain on foreign fields only small for another year at least.

ROOF NOW PERFECTED

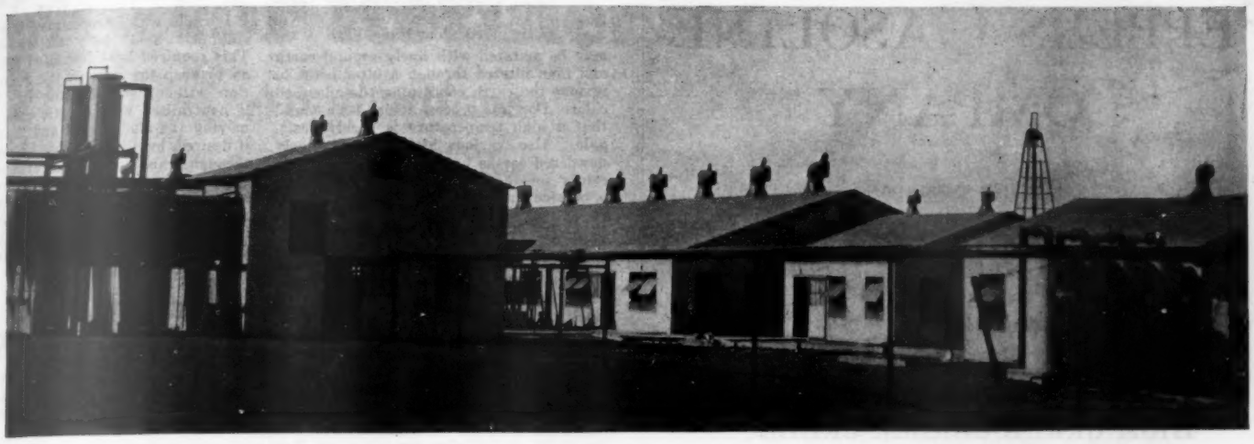
The Chicago Bridge & Iron Works announces that the Wiggins floating roof has been perfected and standardized. It will now be offered to the oil industry as a piece of equipment which can be ordered with assurance that it is no longer an experiment. The many roofs which have been built and placed in service are said to be operating successfully. Two or three minor difficulties have been overcome by an improvement in the design of certain parts of the roof.

The sleet storm which generally covered the United States in December had no detrimental effect upon the roofs in the northern part of the United States. Two drainage systems have been perfected, either one of which is efficient and entirely satisfactory, according to the announcement.

Evaporation tests, the company says, have shown that the savings predicted for this roof were underestimated. The company maintains offices in Chicago, New York, Dallas, Atlanta, San Francisco, Toronto, Montreal, Havana, and Tampico.

OIL TAXATION IN OHIO

FINDLAY, Ohio, Feb. 23.—G. Ray Moorehart, County Auditor of Hancock County, has been appointed chairman of a committee by the State Tax Commissioner to investigate methods of assessing oil property in Ohio for taxation purposes. Other members are: Charles Dawson, Coshocton County; Charles H. Harper, Morgan County; Carl Richards, Sandusky County and John F. Scott, Washington County. All are county auditors. At present oil properties in Ohio are valued in accordance with daily average production and royalties, but there has been some objections to this system and the committee is authorized to make a complete survey of the situation and submit report.



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The fumes, the heat and the gases are going up and out. The interior of the building is clean and operating conditions are at the best for men and machinery. Swartwout ventilators are doing the job, silently, effectively without attention and without operating cost.

Send for a copy of "The Gospel of Fresh Air." You will find it a most valuable addition to your files. If you will submit your ventilation problems in detail, our ventilation engineers who have solved many and varied ventilation problems for the largest companies in the oil industry, will gladly make complete recommendations, without obligation to you.

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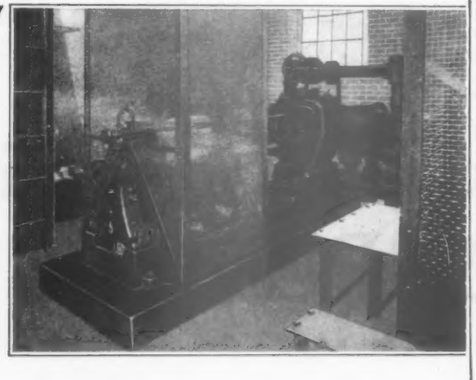

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MODERN PROCESSES FOR TREATING OIL

(Continued from Page 172)

may be agitated with finely ground earth and then filtered through a filter press to remove the earth containing the adsorbed color. For this process it has been found that a high temperature is highly desirable. Also, various high powered, finely powdered earths have been introduced recently for this purpose. But this phase is outside the scope of the present article.

Residual Lubricating Oils

Stocks may be treated directly with sulphuric acid if the stock is kept warm enough to be sufficiently fluid to permit the sludge acid to separate. Or, the stock may be diluted with a volatile oil like kerosene or naphtha. Then after neutralizing, the blend must be brought back to the still and the volatile oil distilled off. This is an expensive procedure and should be avoided if possible.

Anhydrous ammonia gas is a very good agent for neutralizing treated stocks, but it is very important that the sludge acid be thoroughly settled before the anhydrous ammonia gas is admitted to the oil. Otherwise there will be a considerable amount of ammonia sulphate present in the finished oil which may be found detrimental. The use of this anhydrous ammonia gas for neutralizing avoids the production of emulsions which are very liable to be obtained when aqueous neutralizing agents are used.

If the stock is to be cold settled, to make bright stock, the best procedure is to treat the stock without dilution and then after separating the most of the sludge, to dilute with a volatile oil, then permit the rest of the sludge to settle. After that, filter through granular earth or by the contact process with fine earth, either in acid or neutralized condition, after which the solution is cold settled, either by the old fashioned settling process or by the newer centrifuge method, and then the volatile oil is distilled off at as low a temperature as possible with an abundance of steam so as to prevent discoloration of the bright stock.

Sometimes large amounts of acid are necessary in treating stocks and from 20 to 50 pounds of acid per barrel will about comprise the range of this chemical needed.

Paraffin Wax

Paraffin wax is sometimes treated with sulphuric acid in a molten condition. This required heat insulated agitators so as to keep the wax in the molten condition without superheating it. The wax is neutralized with caustic soda after removing the sludge acid and it may then, if desired, be filtered either by percolating through granular Fuller's earth or by contact method, using finely ground earth and the filter press exactly in the same manner as has already been described for lubricating oil, except that the whole must be kept hot enough to maintain the wax in the fluid condition.

OSAGE NATION ASKS NAVAL LEASE RETURN

The United States still holds the Osage oil reserve in western Osage County despite reports that the reserve may be included in the sale of oil leases. It was unofficially reported some time ago that the Osage Indian Council has asked the interior department at Washington to return to the Osage nation the naval oil reserves taken by the Government at the tim eof war.

It is understood the Osage nation claims this oil territory was withdrawn only for the period of emergency and should now be returned to the Osage Indians, and that the department should order the leases sold for the benefit of the Osage Indians.

The naval reserves in the southwest part of Osage County are from a geological standpoint, the finest prospective oil territory in Osage County.

The smaller of the reserves is just south of the Burbank Field and consists of 12,800 acres in Township 25, Range 6, and the larger consists of 22,400 acres in Townships 23 and 24, Range 7.

The presumption is if these leases are withdrawn from the reserve and returned to the Osage nation that the leases will be sold in quarter section tracts at sales extending over a period of years the same as the tracts in the Burbank. Should the tracts prove productive, it would insure the Osage Indians a large income for a great number of years.

RECEIPTS OF CALIFORNIA OILS AND JANUARY PETROLEUM IMPORTS

Receipts of California crude and refined oils at Atlantic and Gulf Coast ports for the month of January totaled 2,426,000 bbls., a daily average of 78,258 bbls., compared with 2,760,000 bbls., a daily average of 89,032 bbls. for the month of December.

Receipts at Atlantic and Gulf Coast ports for the week ended February 7 totaled 559,000 bbls., a daily average of 79,857 bbls., against 377,000 bbls., a daily average of 53,857 bbls. for the week ended January 31.

At Atlantic Coast Ports—	Total January	Total December	Wk. Ended Feb. 7	Wk. End. Jan. 31
Baltimore	385,000	253,000	66,000	74,000
Boston	70,000	74,000	.....	.....
New York	1,377,000	*1,890,000	327,000	75,000
Philadelphia	334,000	369,000	.....	148,000
Others	260,000	81,000	.....	80,000
Total	2,426,000	2,667,000	393,000	377,000
Daily average	78,258	86,032	56,143	53,857
At Gulf Coast Ports—				
New Orleans and Baton Rouge	.....	93,000	166,000	.....
Daily average	.....	3,000	23,714	.....
Total Atlantic and Gulf Coast ports	2,426,000	2,760,000	559,000	377,000
Daily average	78,258	89,032	79,857	53,857

*Revised.

According to figures collected by the American Petroleum Institute, imports of crude and refined oils at the principal ports for the month of January totaled 7,380,000 bbls., a daily average of 238,065 bbls., compared with 6,567,000 bbls., a daily average of 211,839 bbls. for the month of December.

Imports at the principal United States ports for the week ended February 7 totaled 1,799,000 bbls., a daily average of 257,000 bbls., compared with 1,935,000 bbls., a daily average of 276,428 bbls. for the week ended January 31.

At Atlantic Coast Ports—	Total January	Total December	Wk. Ended Feb. 7	Wk. End. Jan. 31
Baltimore	565,000	733,000	116,000	93,000
Boston	503,000	113,000	233,000	55,000
New York	1,952,000	1,192,000	342,000	486,000
Philadelphia	269,000	396,000	47,000	120,000
Others	849,000	1,002,000	195,000	*371,000
Total	4,138,000	3,436,000	934,000	1,124,000
Daily average	133,484	110,839	133,429	160,571
At Gulf Coast Ports—				
Galveston district	908,000	976,000	350,000	152,000
New Orleans and Baton Rouge	1,763,000	1,589,000	287,000	498,000
Port Arthur and Sabine district	444,000	338,000	128,000	86,000
Tampa	127,000	228,000	.....	75,000
Total	3,242,000	3,131,000	865,000	811,000
Daily average	104,581	101,000	123,571	115,857
At all U. S. Ports—				
Total	7,380,000	6,567,000	1,799,000	1,935,000
Daily average	238,065	211,839	257,000	276,428

*Revised.

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(b) Brine Lines
(c) Ammonia-Condenser Lines
(d) Chilling Coils in Oil Line and Brine Line Press Room
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Outside Observation of Press Room Temperature
Oil Line to Press
Oil Heaters to Wax Sweating Room
Wax Sweaters
Wax-Scaling Machine
Slack-Wax Storage Tanks

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Industrial Thermometers
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Oil-Test Apparatus
Aneroid Barometer
Stormograph

4. Refrigeration Plant

(a) Ammonia Compressors
(b) Brine Lines
(c) Ammonia-Condenser Lines
(d) Oil-Chilling Coils

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EASTERN FIELDS

(Continued from Page 50)

Co. started to drill on the Samuel Shafer farm. In Spencer district, the Carter Oil Co. is building a rig on the A. J. Runnion farm. The same company is fishing for a bit on the Craig-Bartlett farm. This company has part of the rig material at a location on the L. S. Merford farm. In Geary district, the Cromwell Oil Co. is rigging up on the Rosena E. Rogers farm. In Walton district, the United Fuel Gas Co. is drilling on the F. E. Marks farm. In Washington district, the Hope Natural Gas Co. is drilling on the A. D. Adams farm.

In McClelland district, Doddridge County, local parties are hauling rig timbers to a location on the George Knight farm. In Liberty district, Marshall County, the Lynn Camp Oil & Gas Co. is placing rig material at a location on the Thomas Blake farm. The Laurel Development Co. is due in the Big Injun sand at a test on the Maude Browning farm, in Carroll district, Lincoln County. In Jefferson district, the Carter Oil Co. has a rig completed on the Matilda Browning farm. In Union district, the Cambridge Gas Co. is starting a test on the Avril Adkins farm.

In McComas district, Cabell County, the Star Producing Co. is fishing at 1,950 feet on the Walter E. Swann farm. In Curry district, Putnam County, the Star Gas Co. is due in the Big Injun sand on the H. C. Osborne farm. In Laurel Hill district, Lincoln County, the Columbia Gas & Electric Co. drilled its deep test on the J. C. Cline farm to a total depth of 4,500 feet and shut down.

Progress Slow at Deep Tests

Trouble at the deep tests is causing delay. The worst is at the Hope Natural Gas Co.'s deep test on the Joseph Gordon farm, near Terra Alta, Portland district, Preston County, West Virginia. One or another kind of trouble has been encountered almost from the time the well was started. Twice there was delay on account of a crooked hole and they had to cement and straighten it. Then followed fishing jobs of a more or less serious nature. The latest delay was caused by losing the bailer and the jars. The bailer was recovered yesterday and they will now try to drill out the bailer. They have reached a depth of 3,349 feet at this well and found nothing but a little puff of gas in the Big Injun sand.

The other deep West Virginia test is the Reserve Gas Co.'s venture on the Chapman Smith farm, in Union district, Harrison County. It is down 1,450 feet and drilling. They have the 12½-inch casing set on the top of the Big Lime at 1,356 feet and if possible will carry a 12-inch hole to the top of the Speechley sand. Unless oil or gas is discovered in commercial quantities, no limit has been fixed as to how deep either well will be drilled. Barring accidents, both will be drilled deeper than any other well, including the deep well on the Lake farm near Fairmont, Marion County.

Near Ligonier, Westmoreland County, Pennsylvania, the Peoples Natural Gas Co. is delayed for the time being at its deep test on the Booth-Flinn property. They found a defective place in the cable and rather than take chances on losing the tools have stopped to splice it. When shut down they had reached a depth of 7,463 feet and were drilling in a close, hard formation. To reach the depth of the Lake well they still have 116 feet to go and at the present rate of making hole it will probably be several months before they drill that number of feet.

Southwest Pennsylvania

The southwest Pennsylvania fields are completing very few wells and nearly all in Green County. In Springhill Township, the Carnegie Natural Gas Co.'s test on the D. King farm has a light show of oil in the fifth sand. It will be shot and tested. In the same township, the Peoples Natural Gas Co. has a gasser in the Big Injun sand on the David Lemley farm. In Richhill Township the Carnegie Gas Co. is drilling on the J. B. Andrew farm. In the same township, Orndoff & McCracken have a Gordon sand gasser on the Sarah McCracken farm. In Perry Township, the Carnegie Natural Gas Co.'s test on the Belle Lemley farm is dry in the fifth sand. In the same township, the Shannon Run Oil & Gas Co.'s test on the George Lemley farm is a gasser in the Big Injun sand.

Light Pumper in Springhill

The Dumar Oil & Gas Co.'s test on the Henry Renner farm is through all sand and good for 2 or 3 bbls. in the Gordon stray sand. On Bacon run, Perry Township, the Shannons Run Oil & Gas Co. has drilled a test on the G. R. Lemley farm into the Big Injun sand. It is a gasser good for 750,000 feet. On the same stream, same township, the Philadelphia Co. has a gasser in the same formation good for 1,500,000 feet at a second test on the Stacey Stephens farm.

MEXICAN FIELDS

(Continued from Page 50)

tional Petroleum Co.'s operations follow: No. 109 is in lime shell at 1,090 feet; No. 145 is in a lime at 2,205 feet, having had a pocket of salt water at 2,190 feet; No. 146 is in white lime at 2,000 feet; No. 148 is in gray shale at 500 feet; No. 149 cemented 8-inch in the San Felipe at 1,190 feet; No. 150 is in the San Felipe at 1,297 feet; No. 151 is running 8-inch in the same formation at 1,200 feet; No. 155 is drilling in gray shale at 830 feet; No. 156 is in shells at 1,155 feet; No. 158 is in shell at 1,130 feet, and some five locations are being rigged. The status of its other active tests remained unchanged since the last report. Mexican Sinclair Petroleum Corp.'s No. 107, Lot 3 cemented 8-inch at 1,220 feet in the San Felipe. Mexican Gulf Oil Co.'s No. 71, Lot 1, is in broken lime at 1,085 feet. Mexican Atlas Petroleum Corp.'s No. 14, Lot 1, is spudded in. New England Fuel Oil Co.'s Nos. 4 and 6, Lot 3, have spudded in.

In Lot 4, Transcontinental Petroleum Co.'s Nos. 131 and 138 have each cemented 10-inch at 1,250 and 1,255 feet, respectively; its No. 140 is in shale at 150 feet; No. 150 is cementing 10-inch in the San Felipe at 1,370 feet; No. 127 and No. 164 are both preparing to cement 10-inch at 1,235 and 1,260 feet, respectively. In Lot 5, its No. 161 is in the San Felipe at 1,350 feet; No. 173 has cemented 10-inch in the San Felipe at 1,280 feet. In Paciencia, just north of Cacalilao, Transcontinental's No. 3 cemented 10-inch in the San Felipe at 1,250 feet; No. 10 is in the same formation at 1,410 feet showing oil and gas, and No. 16 is drilling in the San Felipe at 1,410 feet.

Panuco

In the older sectors of the Panuco district, Credito Petrolero's No. 7, Lot 13 Lomas y Llanos is in the San Felipe at 1,870 feet, and No. 4, Lot 15, same, is fishing for tools in the white lime at 2,262 feet. La Corona Petroleum Co.'s No. 94 Ojital is in shale at 1,050 feet, and No. 95, same, is spudding. East Coast Oil Co.'s No. 25 Laguna de la Milpa is drilling in gray shale at 1,020 feet, and No. 438 Ingenio is in the same formation at 1,605 feet. English Oil Co.'s No. 10 Rufino is in shale at 475 feet. Ita Mex Oil Co.'s No. 1, Lot 14 Lomas y Llanos is in gray shale at 1,450 feet. Gilliam and others' No. 4 Punta Arena cemented 8-inch in the San Felipe at 1,615 feet. Mexican Sinclair Petroleum Corp.'s No. 6 Tananturo is in hard gray lime at 1,784 feet, and No. 8 there is in gray shale at 525 feet. In its No. 4, Lot 6 Camolote, the drill tapped a big volume of gas at around 1,925 feet in limestone. Mexican Atlas Petroleum Corp.'s No. 6 Palangana is moving in material. Sol Oil Co.'s No. 2 Tampuche (Federal zone) is in shales, with some caving going on at 1,970 feet. Tampacos Oil Co.'s No. 4 Barragan is spudding. The Texas Co.'s No. 10, Lot 16 Lomas y Llanos is in brown and gray lime at 2,115 feet, gassing.

South Fields

In the South Fields, Huasteca Petroleum Co., (Mexican Petroleum), No. 54-A Cerro Azul is in shale and shell at 1,705 feet; No. 55 is in brown shale at 1,440

Clean Cutting

The head of the Reed Roller Bit is equipped with four holes for admitting the driving column of slush directly upon the cutting edges.

The maximum force of the slush column is exerted at the point of contact between bit and formation, thus freeing the cutting surfaces from cuttings.

Pumps operated at full force with this bit will show a decided increase in cutting speed.

Cut 'er Buck

This slush lubrication idea on Reed Roller Bits sure is the hot stuff. It works slick as an eel.

Shoot the slush in full stream right where you're gettin' action, and it keeps the cutters clicking right along, kicks the cuttings out o' the way and 'cause the bit works easier, makes it a lot lighter on everybody.

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feet; No. 56 is in gray shale and shell at 865 feet; No. 58 is in gray shale at 565 feet. In Tierra Blanca No. 36 is in gray shale at 1,765 feet, and No. 44 is in brown shale at 1,000 feet. In Chapopote Nunez, No. 10 is in blue shale at 270 feet. In Tres Hermanos, No. 7 is in hard gray sand at 3,015 feet, and over in Granadilla, No. 1 is in sticky shale at 2,804 feet. Mexican Eagle Oil Co.'s No. 24, Lot 132 Amatlan, the "deep" test, is in brown lime at 4,540 feet; No. 27, Lot 198 Amatlan, is running 6-inch shell at 1,958 feet; No. 44, Lot 125 Amatlan is in shale at 1,755 feet; No. 42, Lot 134 Chinampa is in gray shale at 1,775 feet. Agwi Co.'s No. 26 Laguna de Tamiahua is waiting for casing at 111 feet in blue shale. Cortez Oil Corp.'s No. 8 Aguada is fishing for drill stem at 4,360 feet in hard gray shale, and its No. 11 there is drilling in sandy gray shale at 2,970 feet. International Petroleum Co.'s No. 1 Santa Amalia is running 4½-inch at 3,345 in a pink limestone. Mexican Gulf Oil Co.'s No. 39, Lot 146 Amatlan is in gray shale at 1,360 feet. Mexican Sinclair Petroleum Corp.'s No. 14, Lot 226 Amatlan, reported a completion at a subsea level of 1,746 feet, good for say 300 bbls., has ceased flowing and is being deepened.

At Corcovado

In the Corcovado district in the northern fields operations are as follows: Agwi Co.'s No. 2, Lot G, is in gray and green lime at 1,900 feet, with a small showing of oil at 1,850 feet. Cosmos Oil Co.'s No. 1, Lot D, is in gray shale at 458 feet; and it has six more tests in Lot G preparing to spud. La Corona Petroleum Co.'s No. 2, Lot 6 is fishing tools in the Tamasopa at 2,320 feet. Corcovado Petroleum Co.'s No. 3, Lot 6 is in the San Felipe at 2,450 feet, and its No. 5, same lot, has shut down at 2,300 feet to see what No. 3 will do. International Petroleum Co.'s No. 5, Lot 6, is in white lime at 2,620 feet. Intermex Oil Co.'s No. 2, Lot 4-C is in the San Felipe at 2,502 feet; No. 5, Lot 4-D, is in gray shale at 1,250 feet. Leonard and others' No. 1 Garruche Corcovado, is in gray shale at 1,075 feet. Mexican Gulf Oil Co.'s No. 8, Lot 4, is in shale at 300 feet and Nos. 18 and 19, same lot, have each cemented 8-inch at 1,200 feet in the San Felipe.

Miscellaneous Tests

At Ebano, Mexican Petroleum Co.'s No. 39 La Dicha is in limestone at 2,203 feet; No. 53 is in the same formation at 2,150 feet; No. 54 cemented 10-inch at 1,200 feet. In its Chapacao, No. 9 has a crooked hole at 2,260 feet; No. 4 is in shale at 685 feet; No. 16 is in the Tamasopa at 2,265 feet; No. 17 is in broken lime at 1,380 feet; No. 18 is in gray lime at 1,610 feet; No. 19 is in broken lime at 1,325 feet, and No. 5 Margaritas is being deepened, the drill being now at 2,700 feet in a dark gray lime.

At Los Esteros, American International Fuel Co.'s No. 16 is drilling in hard white lime at 2,150 feet.

In the Topila district, Mexican Fuel Co.'s No. 17 Santa Fe is spudding, and No. 18 is drilling in gray lime at 1,675 feet. Cortez Oil Corp.'s No. 1, Lot 8 Cahuayotes is drilling in white lime at 3,194 feet.

In the Marland Field, Cia. Petrolero Franco Espanola, No. 21 Limon, is in black and gray lime at 2,490 feet; No. 22 is in hard blue lime at 1,225 feet.

At El Barco, Mexican Gulf Oil Co.'s No. 51 is in brown and white lime at 2,125 feet; No. 64 is in the same formation at 1,955 feet. Kern Mex Oil Fields, Ltd., No. 9 El Barco cemented 8-inch in gray lime at 1,417 feet, and No. 13 La Palma is drilling in white lime around 2,000 feet.

In its right of way through the Chapacao, National Lines No. 6 cemented 10-inch in gray lime at 1,108 feet; No. 7, with a showing of oil, is fishing a bailer at 2,049 feet; No. 9 is drilling in the Tamasopa at 2,160 feet, and No. 11 is in shale at 204 feet.

In the Laguna de la Puerta, just north of Tampico, Modelo Vincent, No. 1 Casa Piedra has cemented 8-inch at 695 feet in shale.

EAST CENTRAL TEXAS

(Continued from Page 38)

wells; Currie, 1,375 bbls. from 72 wells; Richland, 9,335 bbls. from 87 wells; total 159,784 bbls. from 1,629 wells.

Following is a list of recent completions and near completions in the Wortham Field:

Boyd Oil Co.'s No. 11 Ferguson, sand at 2,980-98 feet, 500 bbls.

Boyd Oil Co.'s No. 1 J. P. Lindley, sand at 3,008-15 feet, 200 bbls.

Rio Bravo Oil Co.'s No. 8, right-of-way, sand at 2,932-74 feet, 150 bbls.

Godley Oil Co.'s No. 1 Colquitt, sand at 2,995-3,026 feet, 2,500 feet of oil in the hole.

Republic Production Co.'s No. A Allmond, sand at 2,980-95 feet; 150 bbls.

Magnolia Petroleum Co.'s No. 22 Boyd, sand at 3,010-20 feet, 525 bbls.

J. K. Hughes Development Co.'s No. 10 Crouch, sand at 2,946-89 feet, 150 feet of oil in the hole.

Humphreys Boyd Oil Co.'s No. 10 Crouch, sand at 2,946-89 feet, 300 bbls.

Humphreys Boyd Oil Co.'s No. 2-B Smith, sand at 2,990-3,003 feet, 200 bbls.

Humphreys Boyd Oil Co.'s No. 14-B Smith, sand at 2,970-96 feet, 250 bbls.

Humphreys Boyd Oil Co.'s No. 5 Ferguson, sand at 3,021-24 feet, 75 bbls.

Humphreys Boyd Oil Co.'s No. 6 Ferguson, sand at 3,005-15 feet, 90 bbls.

Sims Oil Co. and Marland Oil Co.'s No. 5 Simmons, sand at 2,960-82 feet, 100 bbls.

The Texas Co.'s No. 2 Bounds, sand at 2,950-82 feet, 100 bbls.

Moss & Keeling's No. 2 Simmons, sand at 2,945-80 feet, 160 bbls.

Barclay & Meadows' No. 2 Bonner, sand at 2,970-92 feet, 300 bbls.

Humphreys Boyd Oil Co.'s No. 4-A W. D. Wilson, sand at 2,989-3,008 feet, 500 bbls.

Humphreys Boyd Oil Co.'s No. 4-B W. D. Wilson, sand at 2,989-3,025 feet, 40 bbls.

Tri Wy Oil Co.'s No. 1 Edwards, sand at 3,020-25 feet, 26 bbls.

Humble Oil & Refining Co.'s No. 2 E. A. Crouen and others, Wortham townsite, sand at 2,997-3,016 feet, 200 bbls.

Unice and others' No. 1 Raven, sand at 2,950-3,010 feet, 500 bbls.

Parish, Watts & Collins, No. 5 Jackson, sand at 2,971-3,016 feet, 415 bbls.

Humble Oil & Refining Co.'s No. 3 Poindexter, Wortham townsite tested dry in sand at 3,091-98 feet, abandoned.

Humble Oil & Refining Co.'s No. 8-A E. D. Crouch, sand at 2,934-95 feet, 175 bbls.; No. 9-A E. D. Crouch, sand at 2,968-80 feet, 150 bbls. No. 1-B E. D. Crouch, sand at 2,953-89 feet, 200 bbls.

No. 3-D E. D. Crouch, abandoned at 1,757 feet.

Humble Oil & Refining Co.'s No. 9 Ella Dodd, sand at 2,993-3,027 feet, 1,500 bbls.

J. K. Hughes and others' No. 8 E. D. Crouch, sand at 2,965-95 feet, 200 bbls.

Sims Oil Co. and Marland Oil Co.'s No. 1 Hackney, sand at 2,970-3,012 feet, 150 bbls.

E. L. Smith and others' No. 2 A. H. Edwards, Wortham townsite, dry and abandoned at 3,030 feet.

Gulf Production Co.'s No. 4 W. D. Wilson, sand at 3,021-35 feet, 110 bbls. Same company's No. 5 W. D. Wilson, sand at 3,022-34 feet.

Humble Oil & Refining Co.'s No. 5-B Lindley, sand at 2,926-65 feet, 200 bbls.

Ray Massie's No. 2 Seales, McNulty survey, dry and abandoned at 3,037 feet.

CALIFORNIA FIELDS

(Continued from Page 38)

days. The Pacific's No. 2 Baldwin, which is apparently off the structure, has reached a depth of 3,500 feet without even showing a rainbow.

Rideout Heights

The Pan-American picked up an excellent showing in No. 1 Jeserum at 4,404 feet in the Rideout Heights Section of the Whittier Field and the company has hopes of finishing a satisfactory producer if the showings continue a little longer. A good sample was extracted and the hole will be cored ahead in the hope

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CHANNEL SECTION gives greatest resistance to transverse forces

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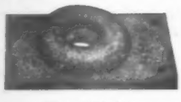

Center Plate

Coupler Yoke

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The improved design combines the advantages of the channel section with those of the new Oval Section giving more efficient metal distribution throughout frame members. Greatest strength is provided at points where most needed to meet service conditions.

Vibration and fatigue tests on these frames demonstrate unusual resistance to fatigue and remarkably low stresses.

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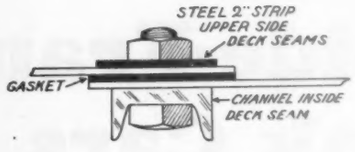
MALONEY

Gas-Tight Deck

CONSTRUCTION



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All Deck seams have channel reinforcements on the under side and a steel strip 2 inches wide on the upper. Bolts being inserted through channels, sheets, packing and strips. All chin or circumference seams have washer reinforcements on the upper and lower sides. Specially prepared packing in seams and joints of all tanks. Maloney Tanks of 250 bbl. capacity and larger have our new, large 20-inch three-quarter circle Clean-out Plate on side flush with bottom.

"Alone in Quality"

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that there will be no break in the sand found.

No. 1-A. Gregg of the Associated is standing suspended at 3,739 feet and it would not be surprising if the suspension were made indefinite pending field developments. The Petroleum Midway has suspended No. 1 Pelllisier at 4,481 feet but is doing a little work on No. 1 Ridcout at 4,620 feet, No. 1 Seward at 4,805 feet and No. 1 Witte at 4,683 feet.

The Standard cemented No. 100 Murphy in the Coyote Field several weeks ago at 4,163 feet but apparently will allow the hole to stand for some time. On the same lease No. 101 is going ahead at 3,200 feet and No. 102 at 3,300 feet, while No. 40 Emory is making hole at 3,198 feet. The company has carried No. 21 Home at Whittier down to 4,345 feet in search of deep production and is still going ahead.

The Birch-Royer Oil Co. has secured an 85-acre lease adjoining the Union's property at Coyote and is hauling in material for the first well. No. 55 Graham and Loftus of the Union, also in this area, will be watched very closely during the next few weeks when a test is made of this 5,533-foot hole. If the company succeeds in finishing a good well it will lead to additional redrilling and deepening work and for this reason the outcome is very important.

Miscellaneous Drilling

It is reported that the Interstate Oil Co. has been refinanced and that a program calling for 15 shallow wells at Newport has been tentatively approved. No. new work has yet been undertaken but it is reported that a location for No. 2 Mesa will be staked within the next week. The Wilshire Oil Co. is drilling in a hard gray sand at 5,350 feet and in its second wildcat at Bandini and will probably list it as a dry hole within a short time.

The Shell has passed the 5,000-foot level in No. 1 Virginia at Los Cerritos, northwest of Long Beach but has not yet picked up any encouraging indications. The Marland ran into a very hard sandy formation in its Davidson City wildcat at 3,551 feet and as a result only made a small footage during the past week. The Manhattan-Pacific Oil Co. is drilling out the cement in its Hermosa Beach wildcat at 3,800 feet and if a satisfactory water shut-off has been secured this hole may give a satisfactory account of itself. At any rate, it is credited with gas and oil showings and it may be possible that the water is preventing it from showing up better.

The Shell Oil Co. has staked location for a new wildcat north and east of the Associated's No. 2 McNally at La Mirada and this hole, which will be known as No. 1 Stubbs, will be spudded in within the near future. There has been considerable wildcatting in this general area during the past few years but so far none of the prospectors have been successful in picking up another structure similar to Santa Fe Springs. The Standard and Associated were the last two companies to finish dry holes in this vicinity, both being carried to extreme depths.

The Union finished rigging up No. 1 Newlin in the Ocean Park Heights district and will spud in this wildcat within the next day or so. It is reported that the Pan-American will wildcat the Palms area in the near future and, although a well was drilled in this vicinity several years ago, it has never been considered a satisfactory test. The Standard has staked a location for No. 1 Hadley near Rivera and this wildcat will probably be spudded in within the next three weeks. The Standard cemented its San Emidio test on Section 28-11-22 at 3,900 feet and reports a depth of 1,345 feet on Section 5-10-22. The Chanslor-Canfield Midway Oil Co. is cleaning out the Sentinel Oil Co.'s old Delano well and should be in a position to begin making new hole within the next week or two. The Standard Oil Co. has passed the 3,240 foot level in No. 1 Cruise at Lost Hills, Section 5-27-20, and this hole has only an outside chance of securing commercial production.

The Union is getting quite deep in its Rio Bravo wildcat, Section 4-29-28, and this 5,440-foot hole has been in the doubtful column for some time. The Main Oil Co. is drilling ahead in its Wasco test at 4,765 feet and it is the intention of the company to drill to at least 5,000 feet before pulling out. There were no new developments in the Kettleman Hills area during the week, the General Petroleum being still held up with a fishing job in its deep hole. The Marland, going ahead in a brown shale at 4,285 feet, is not yet deep enough to prove of interest.

The General Petroleum finished a good well in the Ventura Avenue Field when No. 5 Notten was turned loose from 4,516 feet. Flowing through a ½-inch bean under a pressure of 400 pounds, the well made 1,530 bbls. of clean 29.8 gravity oil during the first full day's test.

Field Operations

Oil field operations reported to the State Oil and Gas Supervisor show 18 new wells started, as compared with 19 during the previous week, a total for the current year of 122, as compared with 219 at the same date last year. Of the 18 notices to drill filed this week, 4 were for wells in the Inglewood Field, 3 in the Rosecrans Field, 1 each in the Long Beach, Torrance, Brea Olinda and Coyote Fields, 1 in Los Angeles County, 1 at Santa Maria, 4 in the fields of Kern County and 1 at Coalinga. There were 23 tests for water shut off made during the week, as compared with 29 during the corresponding period just previous. Deepening or redrilling jobs totaled 14, an increase of 5. There were 9 abandonment notices filed, bringing the total for the year to 60, as compared with 61 at the same date last year. Permits were issued for the following new wells:

Inglewood

Location, Company, Well—
Petroleum Midway Co., Ltd.—
7-2-14 Smith 1.
Standard Oil Co.—
17-2-14 L. A. Lnvestment 2, 2.
17-2-14 Vickers 2, 1.

Rosecrans

Sentinel Oil Co.—
7-3-13 Athens 4.
7-3-13 Walter H. Fisher Corp. 9.
7-3-13 Walter H. Fisher Corp. 10.

Torrance

25-4-14 Marine Corp. 51.

Long Beach

Atlas Drilling Co.—
24-4-13 O'Donnell 37.

Los Angeles County

Union Oil Co.—
10-2-15 Newlin 1.

Brea Olinda

Shell Co.—
2-3-10 Pico 3-A.

Coyote Hills

Birch & Royer—
24-3-10 Nenno 1.

Cat Canyon

26-9-33 Palmer Union Oil Co. 8.

Midway-Sunset

12-11-24 General Petroleum Corp. 59-A.
15-31-22 Manley & McGinn 11.
Petroleum Midway Co., Ltd.—
34-32-24 Dorothy 1.

Kern River

Marland Oil Co.—
16-28-27 Cauley 12.

Coalinga

25-20-14 Pacific Oil Co. 107.

The following wells were abandoned:

Torrance

C. H. & C. Trust—
23-4-14 Victoria 1.

Long Beach

30-4-12 Stevenson & Repp 1.

San Luis Obispo County

Oak Ridge Oil Co.—
4-25-12 Mahoney 1.

Santa Maria

General Pet. Corp.—
6-9-33 Bradley 2.

Wheeler Ridge

22-11-20 Midland Oilfields Co., Ltd. 1.

Kern River

13-29-28 E. A. Parkford 1.

Orange County

20-6-9 Wucherer-Gray Oil Co. Cons 1.
18-6-9 Wucherer-Gray Oil Co. Cons. 3.

Long Beach

19-4-12 Merrill Salvage Co. 3.

GULF COAST

(Continued from Page 42)

at 3,650 feet on the east side of the dome. No. 8 Lusher is rigging. The Gulf Co. is bailing No. 2 Invincible at 2,400 feet and drilling No. 10-C. Blakly at 1,235 feet. The Texas Co. is working over No. 12 Robinson on the northwest side of the dome.

At Spindletop, the Baker Oil Co.'s No. 1 White is drilling at 565 feet and Ellis & Lancaster's No. 1 Burling at 845 feet.

In the Big Creek Pool, the Gulf Production Co.'s No. 17 Davis is at 2,695 feet with No. 18 at 1,760 feet and a derrick standing for No. 19. A location has been made for No. 20. No. 9 Wheat is drilling at 3,010 feet. The Texas Co.'s No. 1 Lingua is at 2,22

feet. The Union Sulphur Co. is drilling No. 10 fee. J. W. Rich is getting ready to start drilling No. 2 Ahlers.

South Louisiana Pools

In the Edgerly Pool, the Roxana Petroleum Corp.'s No. 1 Hunter is at 3,345 feet. The Gulf Refining Co. is deepening No. 36 Bright-Penn at 2,715 feet. G. W. Gray's No. 11 Lilliard is at 2,360 feet.

The Lake Charles Oil Co.'s No. 5 Fairchilds, a workover, flowed 250 bbls. and then eased off. at 2,920 feet.

In the Jennings Pool, the Post City Oil Co.'s No. 2 S. F. S., also a workover, started at 500 bbls. at 1,740 feet, but declined.

The Ina Oil Co.'s No. 2 Medina County, southeast of Hondo, was treated to a shot of nitroglycerin and responded with a small flow by heads. These wells are in a shallow sand around 500 feet.

Status of Tests

The following is the status of tests around known salt domes. At High Island, Galveston County, the Patton Oil Co.'s No. 10 is a 10-bbl. well in the shallow sand. The Sun Oil Co.'s No. 2 Brassard is at 3,277 feet in shale and the Gulf Production Co.'s No. 2 Smith is at 2,975 feet.

At Big Hill in Jefferson County, the Houston Oil Co.'s No. 5 Staiti is at 3,110 feet and No. 2 Gulf-Pipkin at 723 feet.

At Shepherd Mott, Matagorda County, the Marland Oil & Refining Co.s No. 1 Murphy is at 4,709 feet. The Shepherd Dome Oil Co.'s No. 1 Hawkins is at 906 feet.

At Hockley in Harris County, The Texas Co.'s No. 1 Warren is at 1,545 feet and No. 2 at 655 feet.

At Stratton Ridge in Brazoria County, the Stratton Ridge Oil Co.'s No. 16 Dunnehaum is at 765 feet. At Bryan Heights, Bryan & Hamm's No. 1 Chester is at 3,210 feet. At Barber Hill in Chambers County, S. J. Hindman's No. 1 Collier is at 1,745 feet.

Most of the following are formation tests and are being drilled after the location has been designated as a saline dome by the use of either the seismograph or torsional balance methods: Off the Wisdom elevation near the Fort Bend and Brazoria County line, the Ryeade Petroleum Corp.'s No. 2 Nash is below 3,435 feet, with No. 1 Nash reaming at 2,425 feet. No. 1 Meier is around 1,000 feet.

In Fort Bend County, the Gulf Production Co.'s No. 3 Moore is at 1,244 feet. The Pathfinder Oil Co.'s No. 2 Davis is at 1,540 feet.

In Brazoria County, the Gulf Production Co.'s No. 1 Burns is a 655 feet and No. 1 Flagg Pond is rigging with heavy outfit. Gayle's No. 1 Dunsmore is at 1,518 feet.

In Jefferson County, the Paggi Brothers Oil Co.'s No. 1 Wilson is at 644 feet. In Hardin County, The Texas Co.'s No. 1, south of Nome, is at 817 feet.

At Boling Dome in Wharton County, the Gulf Production Co.'s No. 3 Felder is around 3,010 feet. Same company is rigging No. 2 Hackstedt.

A crew with seismographs is now "shooting" the territory between Missouri City and Fulshear, Fort Bend County.

Southwest Counties

In Fayette County, Garroll and others' No. 1, near La Grange, is drilling below 1,900 feet. Burt and others set surface casing in No. 4, near Carlos, in Grimes County.

In the Rockdale-Minerva shallow sand section of Milam County, an increase of activity is noted. Terrell and Lind have started No. 1 Kortz. E. A. Bartlett No. 2 Coluter, Minerva Petroleum Co.'s Nos. 6 and 7 Watson and the Tex Petroleum Development Co.'s No. 5 Phillips.

In Atascosa County, the Witherspoon Oil Co. started No. 1 Langley. Green and others' No. 1 Hoak is at 516 feet. Rutledge and others' No. 1 Kaufman is at 1,615 feet. In Bexar County, George Klemcke is setting up for No. 2 fee. J. M. Davis' No. 1 Koch is at 1,455 feet. LeFevre and Story have a derrick for No. 1 Gier.

In McMullen County the Roxana Petroleum Corp. has started No. 1 McGowan. In Live Oak County, The Texas Co. is drilling No. 2 Reagan. The Houston Oil Co. has three rigs running on the Cartwright ranch. The Southern Natural Gas Co. has laid 10 miles of line to connect with the Plateau-T. P. Coal & Oil Co.'s gasser in the southern part of Live Oak County. The line cost approximately $350,000.

Laredo Districts

February 20, the Texpata Pipe Line Co. posted $1 for Webb, Jim Hogg and Zapata Counties, an advance from 85 cents. More than 288 producing wells in Webb and Zapata Counties and 20 in Jim Hogg County are affected by the change and considerable new work is expected to follow the advance. Wells that have been down will be cleaned and put on the beam in anticipation of still better prices for the production to come later.

The Cole Petroleum Co. set casing in No. 6, located 3½ miles northeast of Bruni, and will test a showing in a sand at 2,430 feet.

Kisselman and St. Albans No. 3 Holbein, Jim Hogg County, which came in last week flowing 2,000 bbls., sanded during the week, but was cleared and is now making 1,500 bbls.

CANADIAN FIELDS

(Continued from Page 48)

Barnwell fields, has passed into the hands of the International Utilities Corp. of New York City through the sale of the holdings of Sir Clifford Sifton and Eugene Coste to the New York interests.

Ontario Deep Test

In the Ontario fields, a new deep test of the Trenton formation is being started by the Union Natural Gas Co. in the Dover Field, Kent County. The Union Natural Gas Co. is also continuing its shallow tests for gas in the Tilbury sand in the old Tilbury Field. In connection with recent drilling in the Kent fields, what are believed to be new records for standard tools have been established. Late last season Eugene Coste & Co's No. 7 near Bear Line, Dover Township, was finished by Kiser Brothers, contractors, the drillers being Charles Shaw and James Thompson. The well was carried to a total depth of 3,813 feet with standard tools, the granite being encountered at 3,810 feet. The well represented 516 feet of 12½-inch hole, 584 feet of 10-inch, 1,800 feet of 8-inch and 913 feet of 6-inch; with 80 feet of 12½-inch casing, 520 feet of 10-inch, 1,100 feet of 8¼-inch and 2,930 feet of 6⅝-inch. The total days drilling, casing, etc., from commencement to completion was 61 days.

In the Tilbury Field, Union Natural Gas Co. No. 255, put down with standard tools by Kiser Brothers with Wayne Kiser and Charles Shaw as drillers, reached a total depth of 1,374 feet, with 235 feet of 10-inch hole, 565 feet of 8¼-inch and 574 feet of 6-inch; the casing including 170 feet of of 10-inch, 240 feet of 8¼ and 806 feet of 6⅝-inch. The total days drilling, casing etc., from commencement to completion was 12½ days, making the unsual record of practically 110 feet a day.

Tillsonburg Field

In the new gas field south of Tillsonburg, in Norfolk County, the Dominion Natural Gas Co. is finishing No. 4 well. Nos. 1 and 2 reported production of 170,000 and 800,000 feet respectively; No. 3 is shut down. The Vacuum Gas & Oil Co. is reported arranging for two tests on the same gas sand on its holdings about 3 miles east of the new field. In the Thamesville shallow pool, it is reported that the Ajax Oil & Gas Co. well, which got a good oil showing at 310 feet in the upper lime, will be carried to 650 feet.

At Toronto McColl Brothers are negotiating with the Harbor Board for a 10-acre site of harbor front property near the foot of Cherry Street, negotiations including dockage rights. McColl Brothers are planning to erect an oil refining and storage plant at an estimated cost of $500,000.

Representatives of municipalities in the natural gas zone in Ontario between the

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Detroit and Niagara rivers met recently at St. Thomas and formed an organization to urge amendments to the existing Natural Gas Acts. Two requests to be urged by the municipal representatives are that pre-existing franchises and agreements shall be restored, and that where municipalities have no agreements, the county judge be empowered to investigate and fix the terms on which gas will be sold. The provisional Government itself is proposing three amendments to the Natural Gas Conservation Act. One of these amendments will provide for an appeal to the courts from the decision of the Natural Gas Board of Reference. A second amendment gives the Natural Gas Board jurisdiction where any mixture of natural and artificial gas is sold; while the third amendment, primarily designed to protect any helium supply that may be developed, gives the Minister of Mines power to regulate any discovery of gas.

Earnings of the Canadian Western Natural Gas, Light, Heat & Power Co. for December, 1924, were approximately 182,909, compared with $105,110 for the corresponding month of the previous year. For the three months ending December 31 the gross earnings were $397,256 as against $260,708 the previous year.

OKLAHOMA FIELDS

(Continued from Page 45)

drilling at 1,585 feet. The same company had a rig up for No. 4 Dickerson, CWL NW NW SE, Section 5-3s-2w. Merrick and others had a rig up for No. 3 Lowery, C NE NW SW, Section 9-4s-2w, The Amerada Petroleum Corp. was spudding in No. 4 Morris, SE cor. Section 20-5s-1, had a rig up for No. 1 Criner, CWL SW SW SW, Section 27-5s-1, and was drilling at 450 feet in No. 6 Clay, SW cor. SE NE, Section 28-5s-1.

Stephens County

The Grisby Oil Co.'s No. 2 Rice, SW cor. NE, Section 27-1s-8w, in Stephens County, was dry and abandoned at 2,260 feet. The Humble Oil & Refining Co.'s No. 6 Ploughman, CEL NE NW, Section 25-1-9w, was completed with sand at 2,068-81 feet, making 20 bbls. naturally.

Crump & Beard's No. 1 Warner, NE cor. Section 22-1s-8w, was drilling at 575 feet. The Grisby Oil Co. had a rotary rig up for No. 1 Worrell, CEL SE SE NW, Section 22-1s-8w. McBride & Foster's No. 1, CNL NE SW SE, Section 22-1s-8w, was drilling at 600 feet. The Magnolia Petroleum Co.'s No. 3 Bond, NW cor. SE NW, Section 19-1-5w, was spudding in. Crump & Beard's No. 1 Gaddes, C SW SE SW, Section 11-35-5w, was drilling at 500 feet. The Ka Wye Oil Co.'s No. 1 Coffett, NE cor. NW NE SE, Section 26-1-9w, was drilling at 100 feet. William Priddy's No. 1 Coffett, NE cor. SE, Section 26-1-9w, was drilling at 1,950 feet. Givins and others' No. 2 Carney, NW cor. SW NW, Section 33-1-7w, was drilling at 450 feet.

Grady County

The Sun Ray Oil Co.'s No. 2 Chandler, NW cor. SE SW, Section 26-5-8w, was shut in for 28,000,000 feet of gas from sand at 2,070-2,420 feet.

Joe Ray and others were spudding in No. 1, C SE SE SW, Section 16-3-5w.

Caddo County

English & Jacobs' No. 1 Swigert, SE cor. Section 32-6-9w, in Caddo County, was completed for 8,000,000 feet of gas with broken sands at 1,907-2,402 feet.

Garvin County

The Texas & Pacific Oil Co.'s No. 1-A Riddle, C SW SW NW, Section 35-1-3w, in Garvin County, was dry and abandoned at 2,630 feet.

KANSAS FIELDS

(Continued from Page 35)

19-25-9, and was building a rig for No. 12 Ladd, CEL NW SE, Section 19-25-9. The Skelly Oil Co.'s No. 2, SE cor. NW, Section 4-23-13, was drilling at 1,100 feet. Jennings Brothers had a rig on the ground for No. 5 Greenwood, CSL SE NW SE, Section 33-22-11. The Theta cor. NW, Section 7-30-1w, was drilling at 700 feet. The Tidal Oil Co.'s No. 1 Milligan, NE cor. SE, Section 6-35-1, was drilling at 1,300 feet. The Prairie Oil & Gas Co.'s No. 1 McCutcheon, SE cor. NW, Section 34-34-2, was spudding in. The Gypsy Oil Co.'s No. 1, SW cor. Oil Co.'s No. 9 Browning, NW cor. NE Section 17-22-10, was drilling at 1,000 feet. H. G. Gillespie's No. 8 Browning, C SW SE NE, Section 19-22-10, was spudding in. The Phillips Petroleum Co. was building a rig for No. 1 Prather, SW cor. SE SE, Section 30-22-10. The Transcontinental Oil Co. was rigging up No. 4 Nuttle, NE cor. SE SW, Section 2-23-9. The Mid-Kansas Oil & Gas Co. was spudding in No. 17 Martindale, CSL SW SW SW, Section 31-23-10. The Phillips Petroleum Co.'s No. 17 Lewis, C NE SW NW, Section 32-23-10, was drilling at 960 feet; the same company's No. 18 Lewis, C SW NE NW, Section 32-23-10, was drilling at 1,000 feet. Braden Brothers' No. 5 Norris, C N half SE, Section 27-22-13, was drilling at 940 feet. The Theta Oil Co.'s No. 20 Schneider, NE cor. SE SW, Section 10-23-13, was drilling at 350 feet, and No. 21, SE cor. NE NW, Section 10-23-13, was rigging up. The Phillips Petroleum Co.'s No. 3 Cravett, C SE SW SW, Section 22-22-11, was drilling at 300 feet. The Tidal Oil Co.'s No. 5 South, C SW SE SW, Section 22-22-11, was drilling at 350 feet. The National Refining Co.'s No. 8 Wick, C NE NW NE, Section 27-22-11, was drilling at 450 feet. The Skelly Oil Co. and the Tidal Oil Co. had a rig on the ground for No. 15 Wick, C NW NE NW, Section 27-22-11. Rodgers & Bitler's No. 4 Allen, C N half SW NW, Section 18-23-11, was spudding in. The Theta Oil Co. was spudding in No. 1 Pixlee, SE cor. SW NE, Section 8-22-10. The Derby Oil Co. and Davis' No. 2 Kipfer, SW cor. NE NE, Section 13-22-10, was spudding in. Pryor & Lockhart's No. 3 Derbyshire, CNL NE SE, Section 13-22-10, was drilling at 400 feet. The Sinclair Oil & Gas Co. was rigging up No. 11 Browning, C NW NE SE, Section 19-22-10. The Transcontinental Oil Co. was spudding in No. 3 Nuttle, C NE NE SE, Section 2-23-9. The Mid-Kansas Oil & Gas Co. was spudding in No. 15 Martindale, C NW NE SE, Section 31-23-10, and No. 17 Martindale, CSL SW SW, Section 31-23-10.

Butler County

The Pure Oil Co.'s No. 5 Maxwell, NE cor. SE NE SW, Section 31-24-4, was drilling at 300 feet. Mason & Ralston and others were rigging up No. 1 Platt, NW cor. SW, Section 6-24-6. Brice & Babcock's No. 1-A Barnhill, C NW NW NE, Section 12-27-7, was spudding in. The Phillips Petroleum Co. was building a rig for No. 1 Sullivan, SE cor. Section 34-24-3. Connell and others were spudding in No. 1 Lingerfelter, SE cor. NW, Section 6-26-7. Brice and others were spudding in No. 1 Barnhill, NW cor. NE, Section 12-27-7. The Imperial Drilling Co.'s No. 1 Benson, SE cor. NE NE, Section 27-24-6, was drilling at 1,730 feet. Matthews and others' No. 1 King, NE cor. NW SW, Section 17-24-4, was drilling at 1,900 feet.

Sumner County

Shawyer & Strosnyder's No. 1, C SW SW NW, Section 7-30-1w, Sumner County, was drilling at 500 feet. The National Refining Co.'s No. 1, C SW SW SW, Section 14-35-1, was drilling at 300 feet. The Marland Oil Co.'s No. 1 Melich, SW cor. NW, Section 14-34-2, was underreaming the 10-inch casing with total depth 2,025 feet. Shawver and others' No. 1 Fay, SW cor. SE, Section 34-34-1w, was drilling at 2,525 feet. The Waite Phillips Co.'s No. 1 Pruit, NE cor. SE, Section 26-33-1e, was drilling at 2,970 feet. The same company's No. 1 Hoskins, SW cor. NE, Section 9-32-1, was drilling at 2,200 feet. The Cosden Oil & Gas Co.'s No. 1 Shade, NW cor. SE, Section 16-31-2, was drilling at 1,800 feet. The Phillips Petroleum Co.'s No. 1 Smith, SW cor. SE, Section 12-30-4w, was drilling at 3,000 feet. Ellis and others' No. 1 Center, SE NW, Section 23-34-2, was drilling at 2,075 feet.

Russell County

Parney and others' No. 1 Cooper, SE cor. Section 33-12-11w, Russell County,

(Continued on Page 196)

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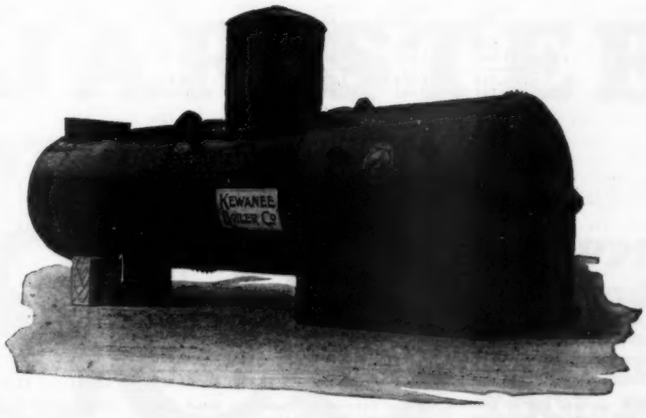

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Preliminary Summary Statistics Crude Petroleum, 1924

From the United States Geological Survey

According to preliminary figures issued by the Department of the Interior through the Geological Survey, compiled from reports of companies that operate gathering lines, 707,265,000 bbls. of petroleum was transported from producing properties in the United States during the year 1924. Final figures, which will include the quantity of petroleum consumed for fuel on the leases and the net change for the year of stocks held on producing properties, obtained from the annual canvass of producers, may show a total output for the year of approximately 714,000,000 bbls. This output is 2 per cent less than that in 1923 and marks the first annual decrease in production since 1906.

Preliminary estimates indicate that world production of petroleum in 1924 was somewhat less than the 1,019,000,000 bbls. which was produced in 1923. Available figures indicate that the decreases in the United States and Mexico will not be entirely offset by gains in Russia, Persia, Rumania, Venezuela, and in other countries.

Imports into the United States of almost 78,000,000 bbls. of crude oil, in 1924, were 4,000,000 bbls. less than those in 1923. Exports of crude oil, amounting to 18,000,000 bbls., increased slightly. Indicated deliveries to domestic consumers, amounting to more than 748,000,000 bbls., increased 5 per cent as compared

(Continued on Page 210)

PRODUCTION BY FIELDS

(Thousands of barrels of 42 U. S. gallons.)

	January	February	March	April	May	June	July	August	September	October	November	December	1924	1923
Appalachian	2,101	2,105	2,264	2,336	2,364	2,255	2,401	2,251	2,299	2,440	2,074	2,159	27,049	28,335
Lima-Indiana	162	181	202	209	210	211	207	192	194	202	158	160	2,288	2,484
Illinois and Southwest Indiana	682	704	785	679	774	748	783	743	737	765	670	662	8,732	9,696
Mid-Continent	25,974	26,849	30,364	30,577	32,281	31,406	32,390	33,260	32,430	32,216	30,693	30,289	368,729	348,460
Gulf Coast	2,261	2,360	2,419	2,214	2,303	2,260	2,363	2,298	2,288	2,517	2,266	2,103	27,642	33,271
Rocky Mountain	4,372	3,914	3,782	4,118	3,887	3,604	3,664	3,847	3,355	3,100	2,669	2,449	42,761	47,653
California	20,913	19,341	19,913	19,300	19,834	18,808	19,275	19,113	18,308	18,697	17,767	18,795	230,064	262,870
Total	56,455	55,454	59,729	59,433	61,653	59,292	61,083	61,704	59,611	59,937	56,297	56,617	707,265	*732,497

*Includes 18,000 bbls. produced in Alaska, Missouri and New Mexico.

IMPORTS AND EXPORTS OF CRUDE PETROLEUM*

(Thousands of barrels of 42 U. S. gallons.)

	January	February	March	April	May	June	July	August	September	October	November	December	1924	1923
Imports†														
From Mexico	6,248	6,511	8,316	6,988	6,718	6,206	5,900	5,324	4,902	4,653	6,373	5,841	73,980	79,354
From other countries	55	.....	315	309	675	454	602	438	452	220	276	.....	3,796	2,661
Total	6,303	6,511	8,631	7,297	7,393	6,660	6,502	5,762	5,354	4,873	6,649	5,841	77,776	82,015
Exports:														
Domestic crude oil:														
To Canada	678	917	973	1,242	1,195	1,125	813	907	859	887	910	486	10,992	8,875
To other countries	802	734	476	278	628	392	556	298	956	489	526	542	6,677	8,236
Foreign crude oil	48	29	35	27	27	25	48	37	20	47	17	16	368	324
Total	1,528	1,680	1,484	1,547	1,850	1,542	1,409	1,242	1,835	1,423	1,453	1,044	18,037	17,435
Excess of imports over exports	4,775	4,831	7,147	5,750	5,543	5,118	5,093	4,520	3,519	3,450	5,196	4,797	59,739	64,630

*Bureau of Foreign & Domestic Commerce, revised as of January 13, 1924. †Including some topped oil reported to Bureau of Foreign & Domestic Commerce as crude oil.

SHIPMENTS OF CALIFORNIA OIL THROUGH PANAMA CANAL TO EASTERN PORTS IN UNITED STATES

(From the Panama Canal Record)

(Compiled from declarations by masters of vessels reported in tons of 2,240 pounds.)

	January	February	March	April	May	June	July	August	September	October	November	December	1924	1923
Crude oil: Long tons	692,443	634,336	623,472	402,672	497,413	459,251	392,466	347,149	486,786	336,431	285,836	331,046	5,489,201	7,257,911
Barrels (approximately)	5,055,000	4,631,000	4,551,000	2,933,000	3,631,000	3,353,000	2,865,000	2,534,000	3,554,000	2,456,000	2,087,000	2,417,000	40,073,000	52,983,000
Refined products: Long tons	43,710	40,747	30,343	55,576	49,888	53,395	49,714	148,964	44,343	60,835	30,321	53,818	661,654	459,328

PRODUCTION BY STATES—PRELIMINARY

(Petroleum transported from producing properties. Thousands of barrels of 42 U. S. gallons.)

Final figures will include petroleum consumed on the leases and produced but not transported from producing properties, which items for the past few years have amounted to approximately 1 per cent of the total.

	January	February	March	April	May	June	July	August	September	October	November	December	1924	1923
Arkansas	2,695	2,915	3,560	3,830	4,445	4,178	4,409	4,195	3,802	3,760	3,340	3,044	44,209	36,610
California*	20,913	19,341	19,913	19,300	19,834	18,808	19,275	19,113	18,308	18,697	17,797	18,795	230,064	262,870
Colorado	5.5	7.7	7	7	7	9.1	47	75	56	64	64	54.7	404	88
Illinois	630	649	733	618	712	690	721	688	682	708	621	613	8,065	8,707
Indiana:														
Southwestern	52	55	52	61	62	58	62	55	55	57	49	49	667	793
Northeastern	18	22	24	27	26	26	26	23	22	22	16	16	268	250
Total Indiana	70	77	76	88	88	84	88	78	77	79	65	65	935	1,043
Kansas	2,101	2,118	2,266	2,325	2,500	2,322	2,423	2,655	2,571	2,584	2,393	2,225	28,483	29,259
Kentucky	586.4	594.3	634.4	642.4	650.7	611.4	676.4	615.7	624.3	636.6	566.7	570.4	7,409.7	8,069
Louisiana:														
Gulf Coast	185	168	184	163	185	193	202	192	212	262	224	224	2,394	2,460
Rest of State	1,528	1,421	1,548	1,460	1,651	1,547	1,583	1,582	1,520	1,552	1,507	1,420	18,319	22,469
Total Louisiana	1,713	1,589	1,732	1,623	1,836	1,740	1,785	1,774	1,732	1,814	1,731	1,644	20,713	24,929
Montana	151	141	170	266	254	240	244	283	296	275	240	221	2,781	2,782
New Mexico	.....	.....	.....	.....	.....	.....	.....	19	20	18	15	16	88	.....
New York	102	102	113	111	124	114	111	112	127	122	108	120	1,366	1,350
Ohio:														
Central and Eastern	371	360	393	411	408	391	419	401	411	441	387	412	4,805	4,921
Northwestern	144	159	178	182	184	185	181	169	172	180	142	144	2,020	2,154
Total Ohio	515	519	571	593	592	576	600	570	583	621	529	556	6,825	7,075
Oklahoma: Osage County	2,979	3,256	3,285	3,402	3,477	3,515	3,568	3,192	2,955	3,883	2,977	2,800	39,289	34,161
Rest of State	8,758	8,979	9,818	10,261	10,611	10,694	11,190	12,538	12,816	11,686	12,185	12,070	131,606	122,767
Total Oklahoma	11,737	12,235	13,103	13,663	14,088	14,209	14,758	15,730	15,771	15,569	15,162	14,870	170,895	156,928
Pennsylvania	554	566	628	659	673	643	671	635	646	699	571	590	7,535	7,609
Tennessee	.6	.7	.6	.6	.3	.6	.6	.3	.7	.4	.3	.6	6.3	1
Texas: Gulf Coast	2,066	2,192	2,235	2,051	2,118	2,067	2,161	2,106	2,076	2,255	2,042	1,879	25,248	20,821
Rest of State	7,913	8,124	9,887	9,299	9,597	9,150	9,217	9,098	8,766	8,751	8,291	8,730	106,823	100,202
Total Texas	9,979	10,316	12,123	11,350	11,715	11,217	11,378	11,204	10,842	11,006	10,333	10,609	132,071	121,023
West Virginia	487	482	495	512	508	495	523	487	490	541	441	466	5,927	6,356
Wyoming: Salt Creek	3,487	3,036	2,937	3,158	2,916	2,666	2,701	2,614	2,273	2,043	1,715	1,538	31,084	35,770
Rest of State	728.5	729.3	668	687	710	688.9	672	856	710	700	635	619.3	8,404	9,015
Total Wyoming	4,215.5	3,765.3	3,605	3,845	3,626	3,354.9	3,373	3,470	2,983	2,743	2,350	2,157.3	39,488	44,785
Grand total	56,455	55,454	59,729	59,433	61,653	59,292	61,083	61,704	59,611	59,937	56,297	56,617	707,265	†732,497

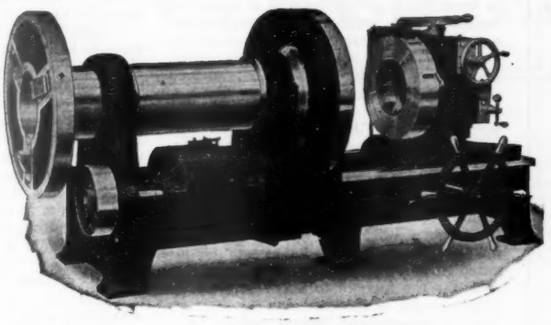
*California preliminary figures (1924) from American Petroleum Institute; final figures (1923) from California State Mining Bureau.
†Includes 18,000 barrels produced in Alaska, Missouri and New Mexico. Final figures.

PIPE LINE AND TANK FARM STOCKS OF CRUDE PETROLEUM

(Thousands of barrels of 42 U. S. gallons.)

Domestic petroleum by fields of origin—		Jan. 31 1924	Feb. 29	Mar. 31	Apr. 30	May 31	June 30	July 31	Aug. 31	Sept. 30	Oct. 31	Nov. 30	Dec. 31 1924	Dec. 31 1923
Appalachian:														
New York, Pennsylvania, West Virginia, Eastern and Central Ohio:	Gross	6,758	6,670	6,530	6,357	6,566	6,474	6,825	6,773	7,000	7,190	7,177	7,264	6,606
	Net	6,483	6,394	6,257	6,083	6,296	6,205	6,564	6,544	6,742	6,930	6,926	7,023	6,331
Kentucky:	Gross	2,969	2,853	2,697	2,656	2,673	2,723	2,748	2,645	2,544	2,534	2,521	2,388	2,097
	Net	2,847	2,731	2,569	2,526	2,543	2,607	2,627	2,533	2,416	2,406	2,398	2,267	2,079
Lima-Indiana:	Gross	1,186	1,193	1,235	1,234	1,264	1,314	1,370	1,416	1,465	1,495	1,433	1,431	1,331
	Net	950	957	999	1,005	1,035	1,084	1 146	1,192	1,254	1,280	1,218	1,221	972
Illinois-Southwest Indiana	Gross	11,619	11,456	11,467	11,310	11,513	11,463	11,537	11,770	11,845	11,762	11,562	11,401	11,629
	Net	11,071	10,998	11,009	10,843	11,016	10,966	11,040	11,268	11,314	11,231	11,031	10,870	11,091
Mid-Continent:														
Oklahoma, Kansas, Texas (exclusive of Gulf Coast)	Gross	179,426	179,273	178,769	180,416	181,749	185,190	187,541	191,464	192,737	192,763	191,239	186,640	163,963
	Net	168,182	167,860	168,216	168,944	170,073	173,441	176,045	179,938	180,866	181,663	180,245	175,624	171,701
North Louisiana and Arkansas:	Gross	33,744	33,796	35,131	36,874	38,396	39,483	39,023	38,252	37,461	37,843	36,691	35,944	32,937
	Net	31,864	31,905	32,681	34,794	36,223	37,286	36,886	36,112	35,348	35,709	34,657	33,705	31,122
Gulf Coast:	Gross	23,936	24,015	23,339	22,666	22,348	20,776	21,435	21,631	21,694	21,535	21,106	20,565	24,355
	Net	23,532	23,596	22,917	22,233	21,914	20,376	21,035	21,106	21,253	21,128	20,723	20,200	23,974
Rocky Mountain:	Gross	21,449	22,883	23,921	25,378	26,386	27,287	28,248	29,702	29,810	29,224	28,960	28,698	19,718
	Net	21,408	22,859	23,888	25,349	26,374	27,275	28,226	29,676	29,784	29,201	28,937	28,675	19,704
Total	Gross	280,987	282,139	283,089	286,891	290,895	294,720	298,727	303,553	304,546	304,346	300,689	294,331	262,636
	Net	266,337	267,300	268,536	271,777	275,474	279,240	283,569	288,369	289,006	289,548	286,135	279,584	267,688
California*		63,314	63,151	64,986	65,045	66,154	66,463	67,181	69,469	70,104	68,640	69,226	69,813	63,163
Imported petroleum held in the United States by importers elsewhere than at refineries:														
At Atlantic Coast stations:	Crude	253	263	175	312	357	248	215	297	264	197	179	176	324
	Topped	2,225	2,638	3,092	3,093	3,171	3,638	3,692	3,554	3,203	3,127	3,218	2,576	2,806
At Gulf Coast stations:	Crude	957	1,013	1,114	1,069	978	913	984	796	555	461	572	536	1,069
	Topped	656	537	628	632	617	716	599	500	563	401	328	312	565
Total imported petroleum		4,091	4,441	5,009	5,106	5,123	5,515	5,490	5,147	4,590	4,186	4,297	3,499	4,764
Total domestic and imported petroleum		333,742	334,892	338,531	341,928	346,751	351,218	356,240	362,985	363,700	362,374	359,658	352,896	334,776

*Producers', pipe line and tank farm (but not refinery) stocks of crude oil, residuum and tops (American Petroleum Institute).



NEARLY

99 44/100%

One Company in the oil field writes: "We are doing 98% of the pipe and casing threading in this locality, and want to open another shop in a new location. Please place our order for two more large Duplex machines with extra wide skip tooth dies and sliding heads like we have here. Please rush all possible."

Let us help solve your threading problems.

BIGNALL & KEELER MACHINE WORKS,
of the N. O. Nelson Mfg. Co.,
Edwardsville, Illinois

BIT AND JAR-STEEL

BOX-PIN-STEEL-SLIP-STEEL

UNDER-REAMER-BODY and CUTTER STEEL, DRILL COLLAR STEEL

ASCO

CAPPING and SOCKET STEEL TOOL-JOINT STEEL

SPECIAL-HIGH-GRADE

SPECIAL ALLOY STEEL **FORGING-BILLETS** **QUALITY and SERVICE**

Manufactured By

ANDREWS STEEL CO.

NEWPORT, KY.

Mr. Seller and USER of Manila Drilling Cables and Bull Ropes

The Ajax Rope Company, well known in the Oil Districts, has secured the services of

Eastman Bros. & Russell
Dallas, Texas

who have served the states in the southwest for over thirty years, and whose honest merchandising has put them in the class of Square Shooters, to represent them as District Sales Managers.

Those who know the Eastman Boys and Col. Russell will be happy to have this information and to them that are still unacquainted you have a treat in store.

Ajax Quality demands high type representation —we have it now and are ready to serve you.

R. S. O. Lawson, President

SEND US A CATALOGUE AND ROPE DOPE

Name.....

City.....

State.....

TEMPERATURE MEASURING INSTRUMENTS

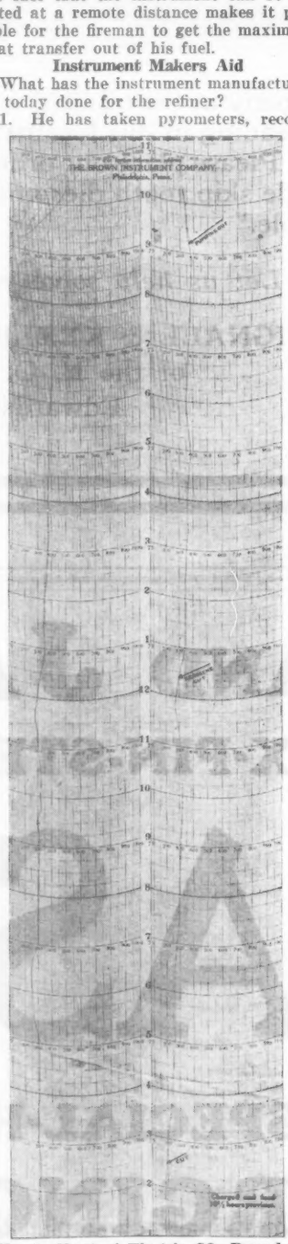
(Continued from Page 138)

the difference in thermo conductivity of the gases which permits the indicating or recording of a CO_2 content at a remote distance and with little maintenance cost. This instrument is comparatively new even in the oil industry but shows great promise and in the installations that have been made has brought forth great enthusiasm. This electric CO_2 recorder is made in several combinations one of which includes the percentage CO_2 and stack temperature side by side on the same chart. Figure 5 shows a chart taken from an installation of such a combination in a prominent refinery in Oklahoma. With such a chart and with the fact that the instrument can be located at a remote distance makes it possible for the fireman to get the maximum heat transfer out of his fuel.

Instrument Makers Aid

What has the instrument manufacturer of today done for the refiner?

1. He has taken pyrometers, recording thermometers and recording pressure gauges which had been used in other industries and changed their design to give accurate records with maximum life and convenience to the operator; as stated above there is no industry in which the manufacturer has paid so much attention to the design of his product as in the case of the instruments manufactured for applications in the oil industry.



No. 5—Chart of Electric CO_2 Recorder, showing percentage CO_2 and stack temperature. Chart taken from actual installation at a large Oklahoma refinery.

2. He has made it possible to manufacture continuously in a commercial way a product of definite characteristics which will meet the New Navy specifications.
3. He has made it possible for the refiner to know whether the product is being manufactured in an economical way—to know the operating cost.
4. He has made it possible for the refiner to know and locate any leaks in his refining practice due to neglect or ignorance on the part of his men in maintaining correct temperatures.
5. He has made it possible for the refiner to turn his attention to the efficiency of his combustion in his still—which means less cost and more profits.
6. He has opened up the possibilities of maximum throughput, with minimum loss, by automatically holding the temperatures of a still and vapors to condenser.

Future Improvements

There are controls on the market which are of a great assistance to a refiner toward this and as yet there is not a control that is completely automatic.

What can the refiner expect of the manufacturer in the future?

1. Because the manufacturer now has a research hitherto unknown, a model shop, and a policy of building instruments of improved design and then subjecting them to strenuous breakdown tests, he can expect instruments which will be even more rugged, have longer life and accuracy and require less maintenance.
2. In the field of combustion efficiency he can expect great assistance from the electric CO_2 recorder designed to meet application in refinery practice; the possibilities of its use and fuel economy need not be mentioned.
3. In the field of automatic temperature control, he can expect a control—not borrowed from other industries, but one designed for his own particular requirements. He can expect one which will hold the temperature of his furnace better than his best operator, one which will take into consideration the lagging condition in his furnace and make corrections in his fuel supply which will be eased off as the furnace responds to the adjustment.

ROCKY MOUNTAIN AREA

(Continued from Page 134)

discovery well of a new phase of the Sunburst operation. No other well in the field has ever produced so much gas as this strike and it is considered located on a local high spot. As the gas is taken out, the well is expected to go to oil.

Weekly Field Runs

Salt Creek	67,500
Teapot	1,920
Big Muddy	3,210
Grass Creek	1,554
Elk Basin	850
Greybull	30
Rock River	3,300
Rex Lake	90
Lance Creek	720
Poison Spider	140
Osage	350
Hamilton Dome	550
Lander	300
Byron	60
Pilot Butte	30
Lost Soldier	4,930
Ferris	110
Cat Creek	3,500
Sunburst	3,340
Craig	760
Fort Collins	600
Florence	345
Hogback	340
Artesia	770
Rattlesnake	190
Miscellaneous	330
Total	95,733

Production for January

Salt Creek	1,771,070
Teapot	66,760
Big Muddy	106,500
Grass Creek	46,650
Elk Basin	21,510
Greybull	630
Rock Creek	90,900
Rex Lake	2,250
Lance Creek	22,070
Poison Spider	5,670
Osage	10,550
Hamilton Dome	12,300
Lander	6,600
Byron	1,950
Pilot Butte	930
Lost Soldier	145,290
Ferris	3,410
Cat Creek	106,650
Sunburst	103,585
Fort Collins	21,525
Craig	20,900
Florence	7,455
Hogback	5,950
Artesia	13,750
Rattlesnake	2,400
Miscellaneous	11,000
Total	3,625,350

25 CENTS per line first insertion; 15c per line each additional insertion. Cash in advance.

CLASSIFIED WANTS

MAIL your advertisement now. It will be published next week. Cash with order.

FOR SALE—EQUIPMENT

FOR SALE

Any part 50,000 feet 2-inch 1800 line pipe two years old.
THE PEERLESS OIL & REFINING CO.
Chanute, Kans.

FOR SALE—Two new stills 10' 6"x 40'. One piece bottoms of half-inch steel, domes unattached. Located at Cushing, Oklahoma. Leo Kaufman, Phone 3-2455, Tulsa, Okla.

WILL PURCHASE—Two (2) 6,000 gallon or 8,000 gallon used tank cars. State full particulars in first letter to Box 91, Sweet Grass, Mont.

KINDLE SEPARATOR
Recovers Waste Oil
Recovers 90% oil and gasoline absolutely free from water.
Automatic, continuous refinery installation of simple double baffle system.
Can accommodate any discharge.
Write for free booklets.
KINDLE SEPARATOR COMPANY
Pitman, New Jersey

PIPE — PIPE — PIPE
1"—200,000 feet, second-hand.
2"—100,000 feet, second-hand.
2½"—25,000 feet, second-hand.
3"—10,000 feet, second-hand.
3"—30,000 feet, new.
4"—25,000 feet, new.
4"—20,000 feet, second-hand.
6"—20,000 feet, second-hand, line.
6"—40,000 feet, new, 19½-lb. rotary drill.
8"—25-lb., 10,000 feet, new casing.
8¼"—29-lb., 12,000 feet, new casing.
10"—35-lb., 5,000 feet, second-hand casing.
10"—32½-lb., 10,000 feet, new.
All above in stock, new and second-hand, in first class condition. Get our prices before buying. We know we can save you money.
S. BENDER IRON & SUPPLY CO.
Phones 979-5032
1200 Marshall St., Shreveport, La.

FOR SALE—25 Star drilling machine, one-half mile to railway, priced to sell. Box 248. Wellsville. Kans.

FOR SALE

Gas Engines

2—200 h.p. vertical, 3 cylinder, 16½ in. diameter x 16 in. stroke, Rathburn Jones Producer Gas Engines. Can be changed to use natural gas. Shipping Weight of Engine 43,000 lbs. each.
Each direct connected to—

1—125 kva., 257 r. p. m., 480 volt, 3 phase, 60 cycle, ATB, 28, General Electric Engine type Generators, with amortisseur winding and field rheostat.

Exciters

2—9½ kw., 125 volt, CVC 4, 975 r. p.m. Flat Compound wound belted Exciters, with base, pulley and field rheostat.

Switchboard

1—Switchboard, consisting of:
1 Swinging Bracket.
2 AC Generator Panels.

Address
ILLINOIS GLASS COMPANY
Alton, Illinois

SAVE ONE-HALF
One lot of hook wall casing packers both Oil Well and Larkin type, most all sizes. All new; never used; just overstocked and will sacrifice for half price. Write Box 1745 or Phone 2-2824, Tulsa, Okla.

FOR SALE
Reconditioned Pipe, Casing, and Oil and Gas Well Supplies always carried in stock. Your inquiries solicited. Lee Morrison Supply Co., Bartlesville, Okla.

FOR SALE—EQUIPMENT

FOR SALE — Hydraulic jack for straightening pipe. Also line pipe and casing. Wells with or without rigs salvaged. Estimates cheerfully given. Write Breckenridge Pipe Yard, North Butte Ave., Breckenridge, Tex.

Second-Hand Pipe for Sale
27 miles 3" 7.70 lbs.
8 miles 6" 19.45 lbs.
20 miles 8" 29.35 lbs.
22 miles 10" 41.85 lbs.
All screw thread line pipe, with good coupling and threads. Write us for prices.
BAUR GAS CO.
Eaton, Ind.

FOR SALE—HEINEE BOILERS
Two 225 B. H. P.
Rated on 10 square feet of heating surface per B. H. P. Equipped with cutoff, check and blowoff valves, steam and water gauges, Kirkwood gas burners. Boilers in good condition. Will sell subject to Insurance company inspection. One 600-h.p. Webster Star vacuum feed water heater. Pumps—One National fuel oil circulating system 24"x2"x4" Snow pumps. One No. 2 pulling oil unloading pump; one Marsh boiler feed pump 12"x 7"x12." One Cameron boiler feed pump, 10"x5"x12"; one 10"x10"x15" Stillwell-Bierce-Smith-Vaile duplex water pump; one 12"x10"x12" Gardner duplex water pump; one 4"x4"x4" Worthington duplex pump; one 12"x8"x12" Knowles pump, single; one American Well Work pumping jack, 24" stroke, 3¾" working barrel, double acting, belt drive; one American Well Works pumping jack, 16" stroke, 3¾" working barrel, single acting belt drive; one 10"x10"x12" American Well Works steam driven air compressor. General Electric Generators—one 35-, and one 70-K. W. D. C. with switchboard. Assorted lengths and sizes, shafting pulleys and hargers. Will be glad to quote price and give particulars as to size and capacity on inquiry.
GRAIN JUICE COMPANY
Dallas, Texas

FOR SALE
81,000 ft. 6⅝" 24 lb. 10 thd. S. H. Casing.
28,000 ft. 6" 19.36 lb. 8 thd. S. H. Line Pipe.
10,000 ft. 8¼" 17 lb. P. E. S. H. Casing.
Ranger, Texas District.
"We own it"
LONGHART SUPPLY CO.
Ft. Worth, Texas.

FOR SALE

10,000 ft. P. E. 14-in. O. D. pipe wall thickness .210 full length, 31 lbs. per ft.
10,000 ft. P. E. 16-in. O. D. pipe wall thickness ¼-in. full length 42 lbs. per ft.
Necessary quantity Dresser couplings available. Pipe in first class condition and can be delivered at low prices any southwestern point.

ATLANTIC PIPE & STEEL CO.
30 Church St. New York, N. Y.

FOUR STRINGS of cable drilling tools for sale 15½ inch down Wilson elevators 40 per cent off list f.o.b. cars.
HIVICK & STONE
603 Continental Bldg. Phone W. 4220
Oklahoma City, Okla.

FOR SALE—BARGAIN PRICES
J. H. Williams Flat Link Chain Wrenches.
600 No. 12 at 1.85 ea. net.
130 No. 13 at $3.20 ea. net.
Pipe Cutters. Three Wheel.
970 No. 2 "Walworth" $1.80 ea. net.
600 No. 3 "Trimo" $2.25 ea. net.
All f.o.b. New York.
CHARLES R. BATES CO.
54 Warren St. New York, N. Y.

FOR SALE—EQUIPMENT

FOR SALE—A complete string of strictly first-class standard oil well drilling tools. Oil Well Supply Company make. Arkansas delivery. Room 223, Metropolitan Hotel, Ft. Worth, Tex.

FOR SALE—28 Star drill at Jonesburg, Kansas. Box 36. Florence, Colo.

FOR SALE—REFINERIES

2,000-BARREL Refinery at Jennings, Okla., to be wrecked and sold all or any part. C. T. Benner, Box 301, Jennings, Okla., Phone 31 and 142.

FOR SALE
Oil refinery, 500-bbl. capacity, well equipped, in good repair, ready for operation. Excellent shipping facilities. A bargain, and satisfactory terms to responsible party.
Address
FIRST NATIONAL BANK
Fort Smith, Ark.

EQUIPMENT WANTED

WILL BUY in carload lots pipe thread protectors. M. R. Regan, Rochester, Pa.

WANTED—Complete string of standard cable tools with casing either on rental or acreage basis. Location 7 miles from Denver. For complete details address W. H. Snyder, Jr., 1039 S. Clarkson St., Denver, Colo.

WANTED
150 KW direct current generator, 125 volts, direct connected to natural gas engine, 200 h.p. Give full description, floor space, price, location. E. W. Peters, Danville, Pa.

HELP WANTED

EXECUTIVES, ENGINEERS, $3,000-$25,000, find our individual, confidential service effective in making new connections. Personally conducted by Mr. Jacob Penn, the eminent employment authority, known to leading business men throughout America. Not employment agency. Jacob Penn, Incorporated, 305 Broadway, New York City, New York.

POSITION WANTED

MECHANICAL ENGINEER—Large refinery experience, past six years designing, constructing, testing and operating gasoline plants. Technical graduate, reliable, dependable, capable of taking complete charge of work. Box A-625, The Oil and Gas Journal. Tulsa, Okla.

REFINERY ACCOUNTANT — In charge of department, familiar with producing, refining and marketing. Open for connection with progressive independent. Excellent references. Box A-643, The Oil and Gas Journal, Tulsa, Okla.

UNIVERSITY GRADUATE, Chemistry and Chemical Engineering with eight years experience as chief chemist and superintendent of a large refinery and export terminal desires connection with some reliable oil company. A-1 references furnished. Now employed. Box A-642, The Oil and Gas Journal, Tulsa, Okla.

PURCHASING AGENT or warehouse superintendent. College education; eight years' experience; now employed; desire change. Box A-602, The Oil and Gas Journal, Tulsa, Okla.

POSITION WANTED with reliable oil company as lease man. Have had experience with oil leases. Have been employed in country bank for 10 years and desire a change. Box A-627, The Oil and Gas Journal. Tulsa, Okla.

RELIABLE, experienced drilling superintendent desires position with good company. Best references as to ability, character. Can go anywhere. Write to Box J.P.M., The Oil and Gas Journal, Tulsa, Okla.

COLLEGE MAN—3½ years university training, majored in geology, wants position on geological staff of some reliable oil company. Address F. H. Douglas, Elizabethtown, Ky.

POSITION WANTED

RESPONSIBLE POSITION wanted. Technical graduate, considerable experience in geology, drilling, production and as operator, would like to obtain immediate employment. Have unlimited executive ability and am able to handle any office or field work. If you want a proven hustler, please address Box A-630, The Oil and Gas Journal, Tulsa, Okla.

FIELD SUPERINTENDENT—Practical driller and expert fisherman. Have 10 years' experience handling tools and production in Mid-Continent Field. Now employed, wish to make change. A-1 references. Address Box 722, Bristow, Okla.

EXPERIENCED FIELD MAN
Wants connection with oil company. Will go anywhere. Address Box A-647, The Oil and Gas Journal, Tulsa, Okla.

EXPERIENCED scout wishes place in land department of growing company. F. C., The Oil and Gas Journal, Tulsa, Okla.

FIELD MANAGER with fifteen years experience in Eastern and Mid-Continent fields. Capable of taking entire charge of either drilling or production. Open April Fifteenth. Box A-641, The Oil and Gas Journal, Tulsa, Okla.

ENERGETIC and ambitious young man with proven ability as salesman, five years' sales experience covering Mid-Continent Field, desires connection with reliable firm where results are considered. Box A-646, The Oil and Gas Journal, Tulsa, Okla.

SALESMEN

SALESMEN and Real Estate men wanted to handle lots in the Townsite of Pomona, Arkansas. Just opened, big chance for the right man, lots selling fast, surrounded by drilling wells. Two wells being drilled on Townsite. Big chance for a fortune to lot buyers. This townsite has fourteen hundred lots, also 160 acres cut into acre tracts 200x220. On Missouri Pacific R. R. Write for map and information,
POMONA TOWNSITE CO.
Monticello, Ark.

WANTED

THE SOLAR OIL CO., 414 Patterson Bldg., Denver, Colo., desires established lease brokers to sell its oil leases and royalties, located on structure near drilling wells in Colorado and New Mexico.

WANTED—10 young men who can put up $3,000 each to organize company. Can make $15,000 each on investment within 6 months. Address for particulars Box A-640, The Oil and Gas Journal, Tulsa, Okla.

WANTED—Associates to join in development project. M. L. Wotten, 709 North L St., Tacoma, Wash.

WANTED—Dogs to board. Best of care and feed. F. S. Thompson, Route 1, Tulsa, Okla., just east of McFarland golf links, and one-eighth mile south of Federal Drive.

WANTED — Information regarding zinc, lead, antimony, bauxite, gold and silver deposits, and oil structures in Oklahoma and Texas. Box A-463, The Oil and Gas Journal. Tulsa. Okla.

WANTED—Producing royalties, Kansas, Oklahoma and Texas; give full details. Room 804, 332 South La Salle St. Chicago, Ill.

WANTED—Producing royalties. Oklahoma and Kansas. Give full details. P. O. Box 502. Independence, Kans.

OIL PRODUCTION WANTED
Oil sales, valuations, management, development and operation of properties in all leading fields.
KARL F. DIVENER
950 W. North Ave. Pittsburgh, Pa.

MACHINE WORK

GET OUR PRICE on pattern work and gray iron castings. Acme Foundry & Machine Co., Coffeyville, Kans.

Additional Classified Advertisements on following page

25 CENTS per line first insertion; 15c per line each additional insertion. Cash in advance.

CLASSIFIED WANTS

MAIL your advertisement now. It will be published next week. Cash with order.

BUSINESS OPPORTUNITY

FIVE WILDCAT BLOCKS

I have five wildcat blocks in Southwest Texas, on structures or faults, worked out and recommended by gelogical department of a major oil company. Blocks range from 2,500 to 4,000 acres each. Will give half interest in well and acreage for enough money to drill one well on each block. Drilling not to cost over $20,000 per well. Can sell enough protection acreage to major companies around each well during progress of drilling to pay for well. Don't write. Wire me you are boarding next train for San Antonio, as the proposition demands quick action. T. S. Neal, 411 Travis Building, San Antonio, Texas. References: City National Bank, San Antonio, Texas.

STOCK-BOND issues sold; straight property loans placed; general financing. Box 471. Oklahoma City, Okla.

WINFIELD INDUSTRIAL Tract, 100x140 feet for sale or lease; adjacent to main highway and three railroads. Write Box 526, Winfield, Kans.

GET MONTHLY CASH DIVIDENDS on small investment. Our booklet "Royalties Gold Bonds of the Oil Industry," free. Write E. F. Hyland, 868 Penobscot Bldg., Detroit, Mich.

FOR SALE—Large manufacturing plant in Kansas City. Well equipped shop and foundry making a line of oil field equipment. Centrally located. Switching facilities. On account of age and other interests owner desires to retire. Will sell all or part interest. Box A-605, The Oil and Gas Journal, Tulsa, Okla.

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The Classified Rates are attractive. It costs but 25 cents the line for the first insertion and 15 cents the line for each additional insertion. Six words usually make a line. Cash with the order.

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JOHNSTON DRILLING CO., Inc.
McKinney Bldg.
Oil and Gas Well Contractors
El Dorado, Ark.

We have 24 years' experience in Texas, Louisiana and Arkansas with 100 producing wells to our credit in Elorado and Smackover alone.

We have listed and for sale producing properties, royalties, oil assignments and several blocks of acreage. We will estimate and appraise properties in this field. Let us serve you.

STOCK SELLING

Corporations desiring capital for promotion, development or expansion are invited to communicate with the undersigned.

Courteous consideration; prompt action; established reputation, complete facilities for campaigns of any size.

WILLIAM R. THURSTON

33 West 42nd St. Telephone
New York City Longacre 4990

BUSINESS OPPORTUNITY

CORE DRILL your structure with diamond drills and reduce the hazard of wildcatting. Let us help your geologist correlate structure before you put cable tools at work. Cost is relatively small and possible saving enormous. On well located tracts we will accept acreage in lieu of profits. Drilling Corp. of America. Geo. H. St. Clair, Gen. Mgr., 203 Cosden Bldg., Tulsa, Phone 3-9031.

CAPITAL SEEKERS — Put your project before 1,400 "keymen." Cost trifling under my plan. Details free. Amster Leonard, First National Bank Bldg., Chicago, Ill.

WRITE your advertisement, mail it to The Oil and Gas Journal, and it will be placed in the hands of thousands of producers and refiners in all parts of the world. It doesn't cost much.

INCORPORATIONS

INCORPORATE—DELAWARE
Cost $67, up to $100,000 Authorized Capital. F. L. Mettler, 882 Market St., Wilmington, Del.

DELAWARE incorporator. Charters, fees small, forms. Charles G. Guyer, 901 Orange St., Wilmington, Del.

BUSINESS SERVICE

P. H. LUND, Petroleum Geologist—Exploiting the oil trend system in conjunction with the anticlinal structure theory—a method that is successful in locating oil wells, both in proven and wildcat territory. Examinations, estimates and appraisals of oil properties. Drilling contracts and developments supervised and managed. Consultations free to clients. Write for details. Over 20 years of practical experience in petroleum developments. Main office, 533 Palace Building, Minneapolis, Minn.

F. C. CHILDS
Consulting Petroleum Refinery Specialist.
Plans, specifications, costs for refineries, inspections, and appraisals made for purchasers, processes investigated. Advice on investments, manufacturing difficulties, excessive costs and losses overcome. Refining value of any crude ascertained, 25 years practical experience in all branches of the refining industry.
P. O. Box 264. Telephone 275
Coffeyville, Kans.

JUST THINK. $2.80 will pay for sending a four-line advertisement all around the world four times. A four-line Classified Advertisement usually consists of 24 words and you know a great deal can be told in a few words. Mail your advertisement to the Classified Section now so that you will get in next Thursday's issue.

ELECTRICAL MACHINERY

Largest stock of Electric Motors in Oklahoma.
TULSA ARMATURE WORKS
526 N. Main St., Tulsa, Okla.

AUDITING

AUDITING Income Tax returns, balance sheets and auditing a specialty. Your work solicited. References Muskogee Banks.
H. E. NEWTON
619 East Okmulgee
Phone 2793-J Muskogee, Okla.

OFFICE SUPPLIES

We manufacture (Indexed)
RUBBER STAMPS
Special attention given mail orders
OFFICE APPLIANCES CO.
12 West 3rd St. Tulsa, Okla.

THE SMALL SUM that it costs to insert an advertisement in the Classified Section of The Oil and Gas Journal enables you to place your desires in the minds of men who are always interested in a good proposition.

FOR SALE—MAPS

OKLAHOMA MAPS
FOR SALE—Geological, township and section maps of all counties and districts in Oklahoma. Map Sales Co., 518 Mayo Bldg., Tulsa, Okla.

FREE
Geological Oil Map of the new San Juan Basin fields of New Mexico. Remarkable development now under way—2,500-bbl. wells from 700 feet; oil is 60 gravity Baume; several new fields opening up; new refineries; pipe lines; roads; splendid opportunities for operators and investors in leases and royalties. Write today for accurate maps and report, sent free to Journal readers.
OIL EXCHANGE & BOARD OF TRADE
Farmington, New Mexico

LETTERHEADS—PRINTING

5,000 LETTERHEADS $17.50. 5,000 envelopes to match, $20.00. Samples on request. J. E. Avery Printing Co., Columbus, Ind.

OIL FIELD LEGAL BLANKS—Leases, assignments, releases, township plats, gauge books, run tickets, time books, well records, etc. Request on your letterhead gets free catalog. Olds Press, 215 East Third St., Tulsa, Okla.

PERSONAL STATIONERY—250 letterheads, 150 envelopes on high grade bond paper; attractive type, $3.25. The Public Letter Shop, Pan American Bldg., Tulsa, Okla.

CONSUMERS' LEDGERS
We are prepared to furnish from stock standard forms of Gas Meter Consumers Ledgers. Sample forms and quotations on request. First class material and workmanship.
DERRICK PUBLISHING CO.
Oil City, Pa.

WHITE SPACE at the top and bottom of an advertisement makes it conspicuous. Ask for it in your next advertisement. Figure the cost at regular rates per line.

MULTIGRAPHING

"REAL MULTIGRAPHING"
Every job is the job with us. Direct Mail Advertising Specialists—Multigraphing, Mimeographing, Mailing Lists. Complete Mail Campaigns from you to your prospect's desk.
THE PUBLIC LETTER SHOP
Pan-American Bldg. Tulsa, Okla.

PATENTS

PATENT your oil and gas well apparatus improvements. Write for free booklet and advice. References gladly furnished. Milo B. Stevens & Co., 650 F. St., Washington, D. C. Established 1864

PATENT-SENSE—Free book for inventors seeking largest deserved profits. Write Lacey & Lacey, 718 F St., Washington, D. C. Established 1869.

Read the advertisements in the Classified Wants Section every week. It will help you.

MAIL LISTS

MORE THAN 3,000 accurate listings. Never offered for sale. $100. Box A-648, The Oil and Gas Journal, Tulsa, Okla.

145 NAMES lease buyers, in Tulsa, including all largest producers. Guaranteed. Price $5 for entire list. The Oil Industry Register, P. O. Box 1742, Tulsa, Okla.

MAILING LISTS
Oil and Other Stockholders
in over 1,000 companies; 1260 Texon Oil & Land Co., $10, 3455 Ralph Dudley Oil Co., $25 and 600 other oil companies. Write for detailed price list.
A. F. Williams, Mgr.
166 W. Adams St.
Est. 1880 Chicago, Ill.

MAILING ADDRESSES

HAVE NEW YORK ADDRESS—Mailing privileges, $5.00 monthly, 623 Knickerbocker Bldg., New York, N. Y.

KANSAS FIELDS

(Continued from Page 188)

was drilling at 2,660 feet. The Skelly Oil Co.'s No. 1 Ed Oswald, NE cor. Section 18-12-15w, had the 10-inch casing set at 1,510 feet. The Valerious Oil Co.'s No. 3 Oswald, NW cor. Section 17-12-15w, was drilling at 2,500 feet. The Derby Oil Co.'s No. 1 Sutton, C NE SW, Section 5-12-15w, was mudding off a gas sand at 2,305 feet. The Alcorn Oil Co.'s No. 1 Sellers, SE cor. Section 36-15-13w, was fishing at 3,640 feet.

Sedgwick County

Jasper and others' No. 1 Whitten, SE cor. Section 26-28-1w, in Sedgwick County, was drilling at 600 feet. Tom Johnson's No. 1 Hunsaker, NW cor. SE, Section 29-29-2, was drilling at 3,250 feet. Higgins and others' No. 1 Flemming, SE cor. SW, Section 2-29-2, was drilling at 2,390 feet. Merriman and others' No. 1 Landon, SE cor. Section 14-28-2, was drilling at 3,400 feet. Winter and others made a location for a No. 1, SE cor. NW NE, Section 2-27-4w.

Lane County

Richardson and others had a rig up for No. 1 Dickinson, CWL SE, Section 11-18-27w, Lane County.

Chase County

The Phillips Petroleum Co.'s No. 1 Irwin, NW cor. SW, Section 1-22-8, in Chase County, was drilling at 2,750 feet.

Elk County

The Theta Oil Co. made a location, No. 1, SE cor. NW, Section 3-29-12, in Elk County. The Pure Oil Co.'s No. 1 Webb, NW cor. SW NW, Section 13-31-10, was drilling at 500 feet.

Rooks County

The Trees Oil Co. made a location in Rooks County, No. 1 Minx, SW cor. Section 25-10-19w.

Trego County

Martin McKay's No. 1 Kyser, SE cor. NW SE, Section 9-11-22w, in Trego County, was drilling at 3,260 feet.

Rice County

The Prairie Oil & Gas Co. had a rig up for No. 1 Libby, NE cor. SE, Section 34-20-6w, in Rice County. Jasper and others' No. 1 Walker, SE cor. NE, Section 10-18-6w, was shut down at 2,200 feet.

Reno County

Haynes and others' No. 1 Halloran, C SE NW, Section 28-25-6w, in Reno County, topped lime at 3,612 feet, had a small show of oil at 3,614 feet, and was cleaning out at 3,624 feet.

N. LOUISIANA-ARKANSAS

(Continued from Page 48)

1,885 feet in No. 1 McCarty, Section 5-12-1w, 10 miles northeast of Winnfield.

Arkansas

Columbia County

The Arkansas Fuel Oil Co. is drilling at 2,110 feet in No. 1 W. E. Hardy, Section 1-19-22.

Magnolia Development Co. is drilling in lime at 2,250 feet in No. 1 Phil Lindsay, Section 30-18-19.

Magnolia Petroleum Co. is drilling in rock at 3,110 feet in No. 2 Watson, Section 36-15-20.

Phillips and others are reaming to bottom of hole at 2,730 feet in No. 1 Davis, Section 14-18-21.

Wingfield and Mitchell are drilling in rock at 600 feet in No. 1 Bodcau, Section 4-20-21.

Hempstead County

The Grassy Lake Oil Association is drilling at 1,310 feet in No. 1 Gun Club, Section 27-12-27, and J. G. Wooten at 680 feet in No. 1 Clarke, Section 22-11-24.

LaFayette County

The Kensaw Petroleum Co. is setting 6-inch casing to test one foot of sand at 1,878 feet, in No. 2 Red River Land Co., Section 3-20-24.

Lincoln County

Cambrian and others are drilling at 2,858 feet in No. 1 fee, Section 3-9-3.

Little River County

Grote and others are drilling at 3,410 feet in No. 1 Allen, Section 2-13-31.

Miller County

Dr. High and others are running a core barel test at 1,635 feet in No. 1 Thomas, Section 12-20-28.

NORTH CENTRAL TEXAS

(Continued from Page 34)

No. 1 Burnett showing 30,000,000 feet of gas at 2,470 feet; Marland Oil Co.'s No. 1 Burnett, setting casing at 2,985 feet; Silk and others' No. 3-A Burnett, has 1,500 feet of oil in the hole at 3,040 feet; Skelly Oil Co.'s No. 2 Burnett will drill deeper from 2,959 feet; The Texas Co.'s No. 5 Burnett has gas at 2,345 feet; same company's No. 2-A M. C. Burnett, casing collapsed at 2,765 feet.

Gray County: Anderson and others' No. 1 Bradford has casing stuck at 1,485 feet; Clark and others' No. 1 Combs and Worley fishing at 2,775 feet; Danciger Oil & Refining Co.'s No. 1 Bowers struck quicksand at 475 feet; Holmes and others' No. 2 Morse, setting casing at 2,780 feet; Wilcox Oil & Gas Co.'s No. 1 Worley and Reynolds' rigging to pump.

Wheeler County: Whittington and others' No. 3 Williams and Laycock spudding.

Dickens County: Bowser and others' No. 1 Pitchfork Ranch is spudding.

Shackelford County: Hogan and others' No. 1 Elliott drilling at 3,575 feet; Phillips Petroleum Co.'s No. 1 Jackson-Landreth, drilling at 2,260 feet.

Parker County: Weaver and others' No. 1 Evans drilling at 1,200 feet.

Palo Pinto County: Britton and others' No. 3 Strawn Coal Co. fishing at 3,121 feet; Hart and others' No. 1 Cardwell at 300 feet; Manning and others' No. 1 Hitson, pulling 5-inch casing at 3,710 feet; Phillips and others' No. 1 Caudill cleaning out at 3,555 feet.

Callahan County: Byron Union Oil Co.'s No. 1 Hennessey, fishing at 4,450 feet; Prewitt and others' No. 1 George T. Crane has water trouble at 1,879 feet; same company's No. 1 W. W. Crane underreaming; No. 1 Lineecum fishing at 615 feet; Urban and others' No. 1 Alvord drilling at 960 feet.

Mitchell County: Eastland Oil Co.'s No. 2 Keynard drilling at 2,045 feet; Sloan and others' No. 3 Miller cleaning out at 3,025 feet; Calofirnia Co.'s No. 12 Morrison at 2,400 feet; No. 1 Elder at 2,821 feet.

El Paso County: Burns and others' No. 4 fee at 4,830 feet.

Loving County: P. V. Petroleum Co.'s No. 1 Russell at 365 feet.

Sterling County: Co-Operative Lease & Development Co.'s No. 1 Douthit cleaning out at 2,000 feet; Chicago-Texas Oil & Gas Co.'s No. 1 Durham at 1,437 feet; Fidelity Oil Co.'s No. 1 Hull drilling at 1,850 feet; Ford and others' No. 1 Foster at 1,700 feet.

Coke County: West Virginia O Market Association's No. 1 Mimms at 1,000 feet.

Irion County: Gladys Bell Oil Corp.'s No. 1 Suggs at 1,585 feet; Virginia-Texas Petroleum Co.'s No. 1 Noelke underreaming.

Reeves County: Dome Drilling Syndicate's No. 1 Bell, flowing salt water at 658 feet.

Pecos County: Arkansas Fuel Oil Co.'s No. 1 Blackstone, at 1,015 feet; Plymouth Oil Co.'s No. 1 Perry at 1,700 feet; Trans-Pecos Oil Co.'s No. 1 Thomas will skid rig.

Crockett County: Alidor Oil Co.'s No. 1 University drilling at 1,000 feet; Konowah-Angelo Oil Co.'s No. 1 University at 700 feet.

Brewster County: Brewster Oil Co.'s No. 1 Kokernot fishing at 2,535 feet; Green Valley Oil Co.'s No. 2 Wilson at 750 feet.

Baylor County: Andrade and others' No. 1 Cockrell at 1,150 feet; Duke and others' No. 1 Dippery at 225 feet; McCaldin and others' No. 1 Martin at 600 feet; Maer and others' No. 1 Leathers at 450 feet; Richardson Brothers' No. 1 Wallace at 1,460 feet; Sheldon and others' No. 1 Mills fishing at 500 feet.

Clay County: Ashcroft and others' No. 1 Chilson at 1,670 feet; Atlantic City Production Co.'s No. 1 Scaling fishing at 3,112 feet; Mills and others' No. 1 Holloway at 650 feet; Cumley and others' No. 3 Stine at 1,725 feet; Southern Exploration Oil Co.'s No. 1 Dunn at 1,370 feet.

Montague County: Daniels and others' No. 1 Howard at 910 feet; Humphreys-Boyd Oil Co.'s No. 1 Howard spudding; No. 3 Maddox at 2,007 feet; Mitchell and others' No. 1 Hinds making 10,000,000 feet of gas at 630 feet; Petroleum Production Co.'s No. 1 Howard at 2,180 feet; Texhoma Oil & Refining Co.'s No. 2 Howard has a show of oil at 988 feet.

Cooke County: Leonard and others' No. 1 Hamilton at 600 feet; Pettit and others' No. 1 Nelson at 450 feet; Rawson and others' No. 1 Aldridge fishing at 1,500 feet.

Denton County: Arbuckel Oil & Production Co.'s No. 1 Fontenberry at 1,335 feet.

Wise County: Boonville Oil Co.'s No. 1 Carter at 1,150 feet.

Comanche County: Cox and others' No. 1 Sturkie has a show of gas at 3,390 feet; Mon-Tex Oil Corp.'s No. 1 Goas at 495 feet.

Throckmorton County: McGee and others' No. 1 Martin at 1,040 feet; Plains Production Co.'s No. 1 Erwin at 250 feet; Rider-Foster No. 1 Stubblefield at 350 feet; Skinner and others' No. 1 Newton at 200 feet; The Texas Co.'s No. 1 Smythe at 1,627 feet.

NORTH TEXAS MARKET QUOTATIONS WEAKEN

FORT WORTH, Tex., Feb. 21.—Generally speaking, the week just closed has been rather quiet in the refined oil markets of North Texas. The activity apparent early in the week became sluggish toward the close and prices weakened slightly, in response to lessening demand. A wide spread developed between the buyers and sellers and late in the week comparatively little was moving.

United States Motor oil was sluggish along with other products. Late in the week there were some scattered offerings at as low as 13 cents. Top quotations were given at around 13½ cents, a large spread, but due to refiners refusing to quote less for over March deliveries.

Quotations on 64-66, 375 gasoline were given by the trade at 16 cents to 16¼ cents. There was very little moving at these prices. There were comparatively no export buyers.

The kerosene market was extremely unsettled. Some heavy buying at high prices during the previous week tended to boost the market. The Imperial Oil Marketing Co. was said to have made some heavy purchases but late in the week marketers were unable to move small amounts at 4¾ cents of the 41-43 water white product. However, refiners were refusing to quote deliveries for over March at 5½ cents.

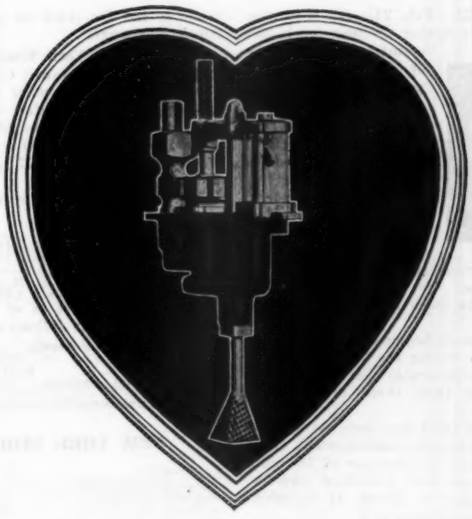
Gas oil, 32-36 gravity, was reported more plentiful and was being quoted at 3⅝ to 3¾ cents. Fuel oil is still a little scarce and quoted at $1.40 to $1.50 per barrel. The water shortage in the Archer County fields which has cut down drilling operations some is having a tendency to lessen the demand for fuel in the North Texas territory.

Natural gasoline had a tendency to weaken along with other products late in the week. Grade A was quoted at 13 cents to 13¼ cents. Early in the week considerable was moved at the higher figure. Grade B was quoted at 12¼ to 12½ cents after a slight loss from quotations early in the week. Grade BB was being quoted at 12 to 12¼ cents. Grade C was quoted at 11¼ to 11½ cents with some little moving at 11⅝ cents. The weakening on natural gasoline was said to be due to refiners failing to make deliveries of U. S. Motor gasoline and they were therefore requesting delays in the movement of natural gas shipments.

TEXAS INCORPORATIONS

OKLAHOMA CITY, Okla., Feb. 21.—Among oil concerns in Texas granted permits by the Secretary of State is the Mid-Continent Petroleum Corp. of Delaware, Ike D. White, State agent, Austin. Among the recent incorporations are Robstown Gas Co., Robstown, capital $100,000, and Robstown Pipe Line Co., Robstown, capital $250,000.

The pump is the heart of a McCord force feed lubricator



Here's the reason for the dependable service rendered by McCord force feed lubricators.

Each McCord pump is a separate unit, has an independent adjustment, can be removed or replaced without affecting the adjustment of any other unit.

Adjustments are easily made without tools, by means of two thumb nuts.

A strongly built strainer keeps out dirt.

All working parts are drop forged steel, case hardened operating in oil.

Pumps are easily detached for cleaning by removing two screws and part of a cross head.

Each pump is tested against 2000 lbs. pressure.

You can depend on a McCord Lubricator—it never forgets.

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RADIATOR & MFG. CO.
Lubricator Division
Detroit, Michigan

For Sale by
The National Supply Co.'s
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McCord
force feed
Lubricators
Standard of the Oil fields

Oil Securities Irregular But Active

Most of News Favorable, No Less Than Three Dividend Increases. General Petroleum Advances to New High. Transit Dividends

Room 543, No. 30 Church St., New York

NEW YORK, Feb. 21.—Oil securities were irregular during the past week, but maintained a high rate of activity. General Petroleum was the feature, advancing to a new high of 55⅞ on heavy transactions. Buying was based on expectations of an increase in the dividend rate. Panhandle Producing & Refining preferred was not active, but the few transactions recorded were at higher figures. On a turnover of only 400 shares the stock advanced 10 points to 60.

Financial news bearing upon oil stocks was plentiful during the week and most of it was of a favorable character. There were no less than three dividend increases.

Shell Union Oil Corp. declared a quarterly dividend on the common stock of 35 cents per share, an increase of 10 cents per share over the preceding quarter. Dividend is payable March 31 to stockholders of record March 2.

Ohio Oil Co. declared a dividend of 50 cents per share, payable March 31 to stockholders of record February 24. Last quarter the company declared a dividend of 25 cents per share.

National Transit Co. declared an extra dividend of 25 cents per share, payable March 16 to stockholders of record February 28.

Cities Service Co. declared a monthly dividend on the common of ½ of 1 per cent in cash and ½ of 1 per cent in stock.

Standard Oil Pipe Lines

Issues of the Standard Oil pipe lines were firm as a result of the increased dividends declared by National Transit and New York Transit and in response to favorable news regarding their business operations.

Shipments of Prairie Pipe Line Co. showed a substantial gain during the first month of 1925, and stocks of oil held by eastern pipe lines have been on the decline, indicating the first excess of deliveries over receipts in some time. Last year was one of the worst in the history of the pipe lines from the viewpoint of earnings, but an abrupt improvement is expected this year.

The following table shows per share earnings of some of the Standard Oil pipe lines companies for 1924 and 1923:

	Par	1924	1923
Indiana Pipe Line	$ 50	$ 5.99	$ 9.65
Northern Pipe	100	5.35	7.70
Southern Pipe	100	2.80	5.47
Cumberland Pipe	100	14.64	26.21
South West Pa. Pipe	100	2.60	7.87
Eureka Pipe Line	100	.64	6.49
New York Transit	100	3.72	4.77

Dividend disbursements by these companies in the same years were as follows:

	1924	1923
Indiana Pipe Line	$ 7.00	$ 8.00
Northern Pipe	8.00	10.00
Southern Pipe Line	8.00	10.00
Cumberland Pipe Line	12.00	10.00
South West Pa. Line	7.00	8.00
Eureka Pipe Line	7.00	11.00
New York Transit	2.00	10.00

It will be noted that dividend payments have in many instances exceeded earnings available for dividends in the respective years. Excess was taken from surplus, most of the pipe lines having built up large surpluses in former years.

Lion Oil

H. D. Williams & Co., members of the New York Stock Exchange, and Strandberg, McGreevy & Co., of Kansas City, are offering for public subscription an issue of 70,000 shares of no-par value capital stock of the Lion Oil Refining Co. at $20.50 per share. Application will be made to list the stock on the New York Stock Exchange.

New York Transit

The New York Transit Co. reported for the year ended December 31, 1924, net income of $186,418, after taxes and depreciation, equivalent to $3.72 per share earned on the $5,000,000 stock, compared with $238,732, or $4.77 per share, in 1923.

The income account for 1924 compares with 1923 as follows:

	1924	1923
Net income	$186,418	$238,732
Dividends	100,000	375,000
Deficit	$ 86,418	$136,268
Profit and loss surplus	1,306,214	1,319,795

The balance sheet as of December 31, 1924, compares as follows:

Assets

	1924	1923
Plant	$6,942,560	$6,966,548
Materials and supplies	103,333	141,377
Cash, accounts receivable, etc.	2,381,017	*2,317,692
Total	$9,426,910	$9,425,617

Liabilities

Capital stock	$5,000,000	$5,000,000
§Accounts payable	903,609	1,007,156
Depreciation reserve	2,217,087	2,098,665
Surplus	1,306,214	1,319,796
Total	$9,426,910	$9,425,617

*Includes other investments. §Includes reserve for taxes and insurance.

Indiana Pipe Line

Indiana Pipe Line Co. reports for the year ended December 31, 1924, net income of $599,433 after taxes and depreciation, equivalent to $5.99 per share (par $50) earned on $5,000,000 capital stock, comparing with $965,944, or $9.65 per share in 1923.

Income account for 1924 compares with 1923 as follows:

	1924	1923
Net income	$599,433	$965,944
Dividends	600,000	$00,00
Deficit	$ 567	*$165,5
Profit and loss surplus	1,871,232	1,871,7

*Surplus.

Balance sheet of the Indiana Pipe Line Co. as of December 31, 1924, compares as follows:

Assets

	1924	1923
Plant	$ 5,126,028	$ 5,007,1
Materials and supplies	66,647	110,4
*Cash, etc.	4,941,566	4,982,7
Total	$10,134,251	$10,100,2

Liabilities

Capital stock	$ 5,000,000	$ 5,000,0
§Accounts payable	339,187	1,046,7
Depreciation reserve	2,363,832	2,272,4
Surplus	1,871,232	1,871,7
Total	$10,134,251	$10,190,8

*Includes other investments and accounts receivable. §Includes reserves for taxes and fire insurance.

NEW YORK STOCK EXCHANGE—LIST OF ACTIVE STOCKS

Stock—	Par	§Dividend Rate	Clos. Feb.20	Quot. Feb.16	1925 High	1925 Low	1924 High	1924 Low	1923 High	1923 Low
American Republics	..	..	*60	*60	66¼	48	48	25	..	..
Associated Oil	25	6	36¼	36	39½	35	34⅝	27⅝	29¼	29½
Atlantic Ref. com.	100	..	113	110	117½	95½	140½	78½	160	98⅜
Barnsdall "A"	25	..	26⅞	25¼	28⅜	21½	22½	14	35	9⅞
California Pet. com.	25	7	27¼	26	30	23⅞	29	19⅞	28½	17½
Cosden & Co. com.	..	..	33⅜	30½	35⅝	26⅜	40¼	22⅝	62¼	23⅜
General Am. Tank	..	†3	52¼	50	58½	51	53	35½	71⅝	40
General Petroleum	25	8	54⅜	51⅛	55⅝	42	45	38⅝	..	..
Houston Oil	100	..	79½	77⅞	85	77½	82½	61	78	40¾
Independent Oil & Gas	..	†1	22	20½	23⅜	13½	16¼	5¾	11¼	3⅜
Indian Refining	10	..	8⅜	8	10⅜	5½	7	3⅜	8½	4
Louisiana Oil	50	..	21	19⅜	23⅝	16⅜	..	..	..	..
Maracaibo	..	..	30⅞	27½	35½	27½	37½	25⅜	28¼	16
Marland	..	..	42½	42	46¼	38¼	42	29	59⅜	18½
Mexican Seaboard	..	..	15½	15¼	22½	15	25⅝	14½	19¾	5⅜
National Supply	50	6	*65	66	71	61¾	72½	54	68	54
Pacific Oil	50	†2	60⅜	59½	65¼	53¾	58¼	45	52¼	31½
Pan American com.	20	12	76½	69	75⅞	64	65	44½	93½	52
Phillips Petroleum	..	†2	42⅜	40⅞	46⅜	36⅝	42¼	28½	69⅝	19¾
Producers & Refiners	50	..	*30	27¾	32⅝	27½	43½	29⅝	58¼	17½
Pure Oil com.	25	6	31	30⅜	33¾	29¼	30¼	20	32	16¼
Royal Dutch, N. Y. sh.	13.40	4.42½	55⅞	54⅜	57⅜	51⅛	59½	40⅝	55½	40½
Shell Transport	10	3.30	*43	43⅜	45⅝	41	42	33	41¼	29½
Shell Union com.	..	†1	26	25⅝	28⅝	22½	22½	15⅜	19¼	12⅜
Simms Petroleum	10	..	21¾	21½	26⅜	20⅞	24	10⅜	16¾	6½
Sinclair Consolidated com.	..	..	21⅞	21½	24⅞	17	27½	15	39⅜	16
Skelly Oil	25	..	28⅝	27½	33⅛	24½	29	17⅛	35	12¼
Standard of California	25	8	64	61⅜	67¼	61⅝	68½	55½	64½	47½
Standard of N. J. com.	25	4	44½	43⅝	47½	40¼	42¼	33	44¼	30⅞
Superior Oil	6	..	5¼	5	6⅜	4⅞	8⅛	2⅝	6⅜	2
The Texas Co.	25	12	47⅜	47¼	49	42⅜	45⅝	37⅜	52⅞	34⅝
Texas Pacific Coal & Oil	10	..	19¼	18⅜	23⅜	11½	15½	8¼	24⅜	5½
Tide Water Oil	100	4	145	144½	149	130	151	116¼	144	94
Transcontinental	..	..	4⅝	4½	5½	3⅞	6¼	3⅜	14½	1¼
Union Oil of California	25	7.2	41½	40	43⅝	37¼	39	35½	..	..
Union Tank com.	100	6	123	120½	127⅝	118½	132⅞	94	114	106
White Eagle Oil & Refining	..	2¼	29	28⅜	31⅝	28	29⅜	23⅛	30⅜	20½
Standard Oil Stocks										
Anglo-American Oil	£1	25	19⅛	19½	20⅜	18	18⅜	14⅜	19¾	13½
Borne Scrymser	100	12	*230	*231	240	225	264	150	153	110
Buckeye Pipe Line	50	14	*66	66	72	62	85½	51	94	57½
Chesebrough Mfg. Co.	25	14	*56	59	70	48¼	52½	29¼	340	205
Crescent Pipe Line	25	..	*13½	*14½	16⅜	12⅜	20	11¼	25	15
Cumberland Pipe Line	100	12	134	136	150	128	148	109	117	80
Eureka Pipe Line	100	8	*84	*87	96	83	105	74	117¼	87
Galena Signal com.	100	4	64⅝	63½	68½	56⅜	69⅜	52⅛	78	55
Humble Oil & Refining	25	4.8	47¼	45⅛	47⅝	42¼	43⅜	36	41	28¼
Illinois Pipe Line	100	12	147½	148	154½	127	161	123	171	115
Imperial Oil, Ltd.	..	†2	31⅝	30½	34⅛	30¼	119	99	123	92
Indiana Pipe Line	50	8	*79	77½	84	73	100	66	103	81
International Pet. Co.	100	x50	27¼	26⅝	28⅜	23	24⅜	16⅞	24⅜	13¼
Magnolia Petroleum Co.	100	4.5	*148	146	159	135	162	124	166	123
National Transit	12.50	16	*23½	*23½	25½	22⅜	25⅞	20⅝	29	19½
New York Transit	100	3	*74	73	75	65½	97	54½	138	70
Northern Pipe Line	100	6	83½	*84	88	80	107½	72	111	96
Ohio Oil Co.	25	8	70⅝	71¼	75¼	64	79½	53	85⅜	48⅜
Penn-Mex. Fuel	25	..	*38	*40	44	35⅜	45⅝	27	45	10½
Prairie Oil & Gas	25	†2	61⅛	60	65½	53¾	269	193	272	152
Prairie Pipe Line	100	8	121½	120⅛	126	106	111	100	117	93
Solar Refining Co.	100	15	*235	230	259	200	240	170	212	161
South Penn Oil	100	..	181	179	197	129	176	117	196	100
South West Pa. Line	100	4	*74	78	84	76½	89	68	89	66
Southern Pipe Line	100	4	87⅛	88	103	85	100	80½	116	87
Standard of Indiana	25	10	66¾	65½	70	62⅛	69⅜	54¼	69⅝	48½
Standard of Kansas	25	..	41⅛	41¼	46	37	50½	32½	56¼	36½
Standard of Kentucky	25	16	117⅝	119	124½	117⅛	121⅛	101	109½	76
Standard of Nebraska	100	20	255	250	270	244	262	198	280	186
Standard of New York	25	5.6	45⅞	45⅝	48⅝	44¼	48	37⅜	49⅜	35½
Standard of Ohio com.	100	10	*353	350	369	338	377½	277	320	270
Swan & Finch com.	25	..	*23	24½	27	22	28	20	..	..
Vacuum Oil	25	†3.75	91	89	96¼	80⅛	83¼	56½	55½	40
Washington Oil	10	..	*32	*30	30⅜	30	29	25	28	20¼
Miscellaneous Stocks										
Cities Service bks. sh.	‡	..	20½	20⅝	21	17⅜	19	13¼	18⅛	12⅜
Continental	10	10	27¾	26⅝	31⅛	25½	..	..	..	..
Gulf Oil Corp. of Pa.	25	6	67½	66	71	65¼	67⅜	56	68¼	45¾

*Bid, no sales. †In dollars. ‡Six per cent cash and 6 per cent scrip annually. §The figures in this column are kept up to date as far as possible, but are not guaranteed. xCents per share.

The Oil and Gas Journal's weekly average price of 20 representative petroleum stocks listed on the New York Stock Exchange was as follows:

Feb. 23	58.02	Jan. 19	54.58	Dec. 15	50.36
Feb. 16	56.96	Jan. 12	55.28	Dec. 8	49.49
Feb. 9	58.39	Jan. 5	53.01	Dec. 1	49.59
Feb. 2	59.24	Dec. 29	51.73	Nov. 24	50.23
Jan. 26	56.09	Dec. 22	50.76	Nov. 17	50.07

COASTAL LUBRICANTS ARE REPORTED FIRM

HOUSTON, Tex., Feb. 21.—Coastal lubricant prices are firm, with refiners not disposed to contract far in the future, fearing another advance on crude prices. Their stocks are very low and sales are not being pushed. A feature of the markets for coastal lubs is the number of inquiries on hand from exporters, said to exceed the inquiries from domestic buyers. One Houston plant is preparing to load out approximately 30,000 bbls. of red oils of different viscosities next month for shipment abroad.

The Deepwater Oil Refining Co. is installing six stills, condensers, tanks and pumps to increase the output of its "New Process" lubricating oils. The company has an extensive foreign business.

The Yuba Refining Co., which operates on Nacogdoches crude has reorganized as the Yuba Oil Refining Co., with Mrs. Phebe Rideout as president, T. E. Baker, vice president and F. I. Tucker, secretary-treasurer. The company has a 200-bbl. plant at Nacogdoches.

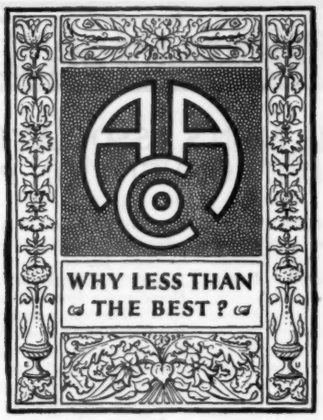
WESTERN PENNSYLVANIA MARKETS NOT SO GOOD

OIL CITY, Pa., Feb. 21.—Despite the fact that there has been an advance in the crude oil market in the meantime the refined market in northwestern Pennsylvania is not today in as good shape as it was a week ago. The refiners and the leading jobbers do not believe this indicates that anything is wrong with the market, but rather they think it is merely a temporary condition which later will be rectified.

Cylinder stocks are holding up good. Neutrals seem to have a hard time holding up at all and some of the refiners state they are softer than they were a week ago. Kerosene is weaker in demand. Gasoline continues to be strong and in good demand with the outlook brighter. The Ohio dealers have considered the margin there is too narrow and they have been out of the market for some time. The latest increase in the tank wagon there is expected to put them again in the market for gasolines. Wax and fuel oil continue to be strong.

COMPLETES PIPE LINE

The Shaffer Oil & Refining Co. has announced the completion of the laying of its 6-inch pipe line from the refinery tank farm near Cushing, Okla., to its Midway pump station in Section 35-16-8, Creek County. The line was flanged up February 22 and the only work to be done is the backfilling of the 20-inch right-of-way ditch.



Taking the "Dicker" Out of a Sale

There are often many and considerable differences between the asking price and the offer in negotiations involving oil properties.

Reaching an agreement by "dickering" is poor business, and is consequently becoming obsolete.

Frequently the shrewder bargainer profits at the expense of the party who is ignorant of actual values. For instance, certain important tangible or intangible factors of value may be overlooked or overrated.

The only way of obtaining correct knowledge of the value of a property is by means of a complete, analytical appraisal of every factor in that value.

An American Appraisal furnishes this analysis.

Engaging an agency to fix the price at which one's possessions may be sold is one of the most important transactions into which one can enter.

Why use anything less than the best?

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Chicago	Indianapolis	New York	Seattle	Montreal Toronto

You will be interested in the analytical methods of appraisaldescribed in our booklet on "Public Utility Valuations." Write for Monograph S-2.

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THE AUTHORITY

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REFINING AND MARKETING

Appoint Bayer Vice President of Tidal Garrett a Director

Lloyd F. Bayer, who has been connected with the Tidal organizations for the past nine years, has been appointed vice president and general manager of the Tidal Refining Co. and the Tidal-Western Oil Corp. of Tulsa, according to an announcement from the New York offices of the company during the past week. It was also announced that A. F. Garrett had been appointed assistant general manager and elected a director of the two companies.

Mr. Bayer, who becomes one of the youngest heads of a major Mid-Continent refining and natural gasoline manufacturing organization, has been connected with

Lloyd F. Bayer

the Tidal companies since 1916. Previous to that he was employed by the New York and Queens Electric Light & Power Co. of Long Island City, N. Y., for two years following his graduation from the Stevens Institute of Technology. He entered the employ of the Tidal companies as an engineer. Later he was chief engineer and previous to his appointment as vice president and general manager was manufacturing manager of the companies' two refineries in Oklahoma and Texas and natural gasoline plants located in Kansas, Oklahoma and Texas.

Mr. Garrett has been sales manager of the Tidal Refining Co. and he will continue to be in charge of sales. (A picture of Mr. Garrett will be found in the rotogravure section of this issue.)

STANDARD DENIES REPORT

CHICAGO, Feb. 21.—When asked regarding a report published in an eastern daily commercial paper and reprinted in Chicago with considerable elaboration to the effect that the Standard Oil Co. (Ind.) was planning to increase its storage at Whiting by the expenditure of about $1,000,000 for the construction of 3,500,000 bbls. of steel storage, executives of the company replied that it was all news to them.

GASOLINE FOR MONTANA RAIL

CASPER, Wyo., Feb. 21.—The Chicago, Milwaukee & St. Paul Railroad is reported to be ready to place gasoline operated cars on some of its branch lines in Montana and also on the main line in place of local trains. Winnett, the rail point for the Cat Creek Field is to have two of these daily.

AMERICAN OIL MEN'S ASSOCIATION TENTATIVE CONVENTION PROGRAM

First Day, Tuesday, March 17

Sessions, luncheons, exhibits and banquet in Kansas City Athletic Club Rooms.

General sessions in Assembly Room, fifth floor.

10 a. m.

Registration, lobby of club.

10:30 a. m.

Important meeting, officers and board of directors.

Luncheon, 12 Noon

Address of Welcome by Albert I. Beach, mayor, Kansas City, Mo.

Response and annual address by President A. J. Callaghan, American Oil Corp., Jackson, Mich.

Address, "Petroleum and Finance," Gov. W. J. Bailey, Federal Reserve Bank, Kansas City, Mo.

Address, "Safety versus Gambling in Petroleum Operations and Legitimate Phases," W. F. Davis, general manager and attorney, Orient Petroleum Co., Wichita Falls, Tex.

Address, "Ethics in Competition," Marco Morrow, general manager, Capper Publications, Topeka, Kans.

Second Day, Wednesday, March 18

10 a. m.

Automobiles will be at the club to take visiting ladies on a drive through the residential section, arriving at noon at the Hillcrest County Club where luncheon will be served. Bridge during the afternoon, returning to the club for the banquet.

Address, "Retail Marketing of Gasoline," Paul B. Erickson, Golden Rule Refining Sales Co., Wichita, Kans.

Address, "Taxing Gasoline," L. F. Kuehnle, Leader Oil Co., president Iowa Independent Oil Men's Association, Dubuque, Iowa.

Address, "Value of System," A. W. Kiefer, President Meridian Oil Sales Co., Lincoln, Neb.

Address, "What an Oil Man Should Know About a Steel Barrel." George A. Moore, general manager, Detroit Range Boiler & Steel Barrel Co., Detroit, Mich.

Address, "Steel Barrels," D. S. Hunter, secretary, Steel Barrel Manufacturers' Institute, Cleveland, Ohio.

Luncheon, 12 o'Clock

This period devoted to State Associations. Responses by the State secretaries.

Wednesday 2 p. m.

Address, "Automobile Lubrication," Col. Theo. A. Peck, chief engineer, Pierce Petroleum Corp., St. Louis, Mo.

Address, "Standardization of Lubricants," A. B. Dawson, General Motors Corp., Detroit, Mich.

Address, "Status of American Shale Oil Development," Dr. Victor C. Alderson, president, Colorado School of Mines, Golden, Colo.

Address, "Art and Architecture in Petroleum," R. M. A. Anderson, architect, 1630 Monroe Building, Chicago, Ill.

Address, "Contribution of Equipment Organizations to Petroleum Development," Alph M. Honnett, director petroleum division, Southwestern Advertising Agency, Dallas, Tex.

Wednesday 6 p. m.

Banquet, entertainment, dancing. In charge of the Kansas City Petroleum Club, Ben Bush, chairman, toastmaster, President A. J. Callaghan, American Oil Men's Association.

Speakers, Mrs. May C. Stoiber, director welfare work, the Nash Co., Cincinnati, Ohio; Dr. Fred C. Loos, Liberty, Mo.

Presentation of ladies' diamond ring.

Dancing.

Third Day, Thursday, March 19

10 a. m.

Address, A. V. Bourque, Natural Gasoline Manufacturers' Association, Tulsa, Okla.

Address, "Prevention of Evaporation and Other Losses," Harry T. Bayard, treasurer, Ennis-Bayard Petroleum Co., Chicago, Ill.

Address, "Organization, Operation and Results of a Retail Gasoline Association," C. C. Hayley, executive secretary, Retail Gasoline Dealers' Association, Dallas, Tex.

Address, "Injuries in Industries," Isaiah Hale, superintendent of safety, Santa Fe Railroad Co.

Address, "Uniform Methods in Oil Accounting," George F. Winters, Phillips Petroleum Co., Bartlesville, Okla.

Luncheon, 12 Noon

Business session, introduction of resolutions and election of officers.

Immediately following the newly elected officers and board of directors will meet for the purpose of selecting the executive committee.

BRYAN'S "GAS" SALE HELD TO BE ILLEGAL

LINCOLN, Neb., Feb. 21.—Gasoline will not be retailed by the State of Nebraska in the future unless the State Legislature appropriates funds for that specific purpose, according to a decision announced by the Supreme Court.

The decision by the State's highest court ends litigation started last summer shortly after Governor Bryan, recently succeeded by the present Governor McMullen, opened a State filling station here and began retailing gasoline. Action was brought by Harry Fischer to restrain the State from selling gasoline but the Lancaster District Court denied his petition. Appeal was taken to the Supreme Court and the decision announced was the result.

The court stated in its decision that no money had been appropriated by the State Legislature to provide for the retail sales of gasoline and no fund could be legally obtained from other sources. The State auditor was therefore permanently restrained from paying future warrants.

The filling station here has been closed for some time as Governor McMullen had refused to authorize the purchase of additional supplies shortly after he was inaugurated as governor.

PHILLIPS PETROLEUM BUYING TWO PLANTS

BRECKENRIDGE, Tex., Feb. 21.—It was announced here that the Phillips Petroleum Co., with headquarters at Bartlesville, Okla., has signed a contract for purchase of two gasoline plants 15 miles southeast of Breckenridge from W. G. Swenson and W. C. Wooten, the consideration being a cash price of approximately $500,000.

The two plants have a combined capacity output of 9,000 gallons daily and are in what is considered one of the richest gas sections of the Breckenridge Field. This deal makes seven plants Phillips has bought in Stephens Fields in less than 12 months, the total consideration involved in the five different deals being approximately $5,000,000.

PENNZOIL EXPANSION

OIL CITY, Pa., Feb. 17.—The Pennzoil Co. has just announced the opening of a branch in Harrisburg, Pa., and that it has chosen as its representative there John Pierce. This branch will have charge of the distribution of Pennzoil in the counties surrounding Harrisburg. The Pennzoil Co. has also made a selling connection with the Central Pennsylvania Oil Co., which operates filling stations and bulk stations at Reading, Robesonia, Lebanon, Harrisburg and Pottsville.

ILLINOIS OIL MEN HOLD PEORIA SESSION

PEORIA, Feb. 21.—Ninety odd oil men attended the meeting of the Illinois Petroleum Marketers Association at the Hotel Jefferson, equally divided between oil distributers and supply men who had come to continue their trade relationships and incidentally to sell gasoline or other products. The jobbers were not in a buying mood and little if any business was put through. The chief topic was the proposed tax on gasoline. The sentiment was that oil men should oppose the tax in every way possible but do it more as citizens than as oil men for the reason that they should have more influence as property owners and business men than members of an industry which might place them under some criticism as having too great a business interest in their opposition to the tax. Many oil companies have already contributed to the emergency fund that was raised when the bill proposing the tax was first introduced. One suggestion was that a sticker be adopted with some pertinent slogan which could be distributed to motorists at the station voicing the opposition to the tax as a burden on the taxpayer. These stickers, if adopted, will be of a kind that can be attached to winshields and back windows of cars. The fact was prominently mentioned that if the public was induced to vote for the $100,000,000 bond issue by a statement that this would furnish all the money required for the administration's good roads program and that this bond issue could be paid through the surplus from automobile license fees. The statement was made that campaign banners still were visible in the outskirts of Peoria asking for votes on these grounds. It was suggested that a photograph of one of these banners be taken and used as a document in the campaign against the tax on gasoline. The statement was made emphatically that there was no present need of the gasoline tax so far as road building was concerned for the State has more funds ready for this purpose as a result of the bond issues and the receipts from licenses than it can possibly use. It takes time to expend such vast sums even in road building by State contracts and it was further urged that equipment was lacking for more rapid road building than was done last year out of the regular receipts from various sources which could be used for road purposes.

The oil men will have great assistance from the automobile clubs and motor freight associations which are active in the fight on the tax as unnecessary and vastly increasing the cost of using autos. The motor truck lines intimate it will necessitate advances in their transportation charges. As they do a large part of the short haul transportation of commodities that will be felt in the cost of living.

OPENS CHICAGO OFFICE

CHICAGO, Feb. 21.—The Atlas Petroleum Co., of Kansas City, is opening an office here under the management of Phil Taxman, formerly of the Taxman Refining Co. E. F. Bergolte, president has been here making arrangements. The offices are to be at room 902 Blum Building. The Atlas Petroleum Co. was organized by E. F. Bergolte and Mayer Taxman last fall with offices in Kansas City. Mr. Bergolte had been the Kansas City representative of the Acme Petroleum Co., and Mr. Taxman the treasurer of the Taxman Refining Co., now the Cosden Sales Corp. Phil Taxman, who will be in charge of the Chicago office was the manager of the refinery which the Taxman Co. operated at Augusta, Kans., and after it sold that plant was located at the Chicago sales office.

Equipment of Natural Gasoline Plants

This Phase of Construction Subdivides Into Extent and Kind, the Former Particularly in Field Development and Flush Production

By Frank P. Peterson

Equipment of natural gasoline plants subdivides into extent and kind. As to the former, it certainly is subject for the mature judgment of the engineer whose available data covers the past, present and proven characteristics of any field in which an installation of plant is contemplated. Much more is this true, if the case be one of new field development and flush production. The tendencies of new fields cannot be definitely predicted. The data available to the engineer assuming the responsibilities should embody a clean, correct record of developed performance to date of beginning the work. It should also lay before him the work of the geologists and the subsurface indications as far as they may be interpreted as influencing life and extent of gas resources. Not one whit less important to the gasoline phase than to the oil of the industry are the rates of bottom water encroachment, top water difficulties and hazards and their treatment by producers, although all factors affecting production of crude may not affect in the same direct and contemporaneous way the production of natural gasoline.

Experience at Cromwell

As to how this may be, the following serves at least hypothetically to indicate: Had the Cromwell Pool in Seminole County, Oklahoma, United States, been treated in an altogether different manner, as it certainly should from a production standpoint, i.e., had top water and the gases of the upper stratum been securely cemented out, the equipment, both as to extent and kind, required to date in gasoline plant development could have left entirely out of consideration any gas compressors. The provision of drips to protect plant and field lines would have permitted wide modification on the side of economy. The size and cost of field lines required would to date of this writing have been modified by vastly reduced proportions and cost and further by the exigency of temporary character of line equipment only. The quantity of gasoline now being produced by two plant installations would have been, in all probability much greater than is being realized, and at a lesser installation cost at least by the cost of compressor equipment now in operation and a medley of expensive manifolds, by-passes and what not of operation control refinements. And, so, the engineer and designer must have knowledge and take account of every conceivable field conditions, even to methods in applied producing operation of any field in order to qualify in the selection of extent and kind of equipment to suit a specific case.

Standardization

Nor are we, to speak, yet of standardization of plant equipment; this may be of the future, not far away. The best minds of the industry seem now to think absorption as a process can be depended upon for the burden of the work for some time, and that no other process appears at present on the horizon to compete in the bigger bulk of natural gasoline recovery. Accepting their conclusion, one should confine his discussion to the things of absorption equipment. If standards may come, it will be all the better, but their absence shall not deter us from our best efforts.

It is needless to say that no set of rules may be expressed for guidance as to extent of equipment to be provided except as related to a specific case, and then only after all the conditions of field and immediate plant environment have been analyzed as carefully as possible.

For a condition of flush gas, where all indications are for reasonable extension of the desired volume, about as good practice as may be suggested, probably, is to get a good estimate of available volume, and where field or pool development and extensions are going forward progressively, provide displacement capacity for the estimated volume, considered as a constant, in compressors to operate through a range from zero gauge intake to plant pressure discharge. At the low range of pressure required for absorption, this will permit of considerable juggling of the compression ratio factor with little loss of displacement efficiency. Consequently, if this suggestion is followed, a low limit of 12 to 15 inches mercury vacuum may be sustained before it would appear to be necessary to begin changing cylinders. This would mean a ratio, $\frac{P_2}{P_1}$ over P_1 around 6.5 which is quite permissible in terms of displacement efficiency. By comparison, at any rate, with the ratio imposed on the little single stage air compressors usually used for starting the gas engine it should be. The ratio in the latter case will vary from about 14 to 18.5, and the practice is a poor, pitiful slighting of detail at the expense of giving all attention to the major factors.

Planned in Advance

It is well to note here that some very recent steps are in progress embodying installation of outreaching booster equipment concurrently with main central plant on flush gas assembly. This is an indication of the rapidity with which the gasoline phase of the industry moves forward. Reference to a diagram, Figure 1, will serve to indicate such probable development as is becoming common in this direction where extensive investment in plant may be planned in advance of a campaign of big effort, with a large potential field development in sight.

Figure 1

In the diagram, Figure 1, let A indicate main central plant. B, C and D can also indicate outreaching stations for gathering gas from a distance the limit of which will be determined within range of efficient pressure drop for the combination of the lowest investment cost in compressors and gathering lines.

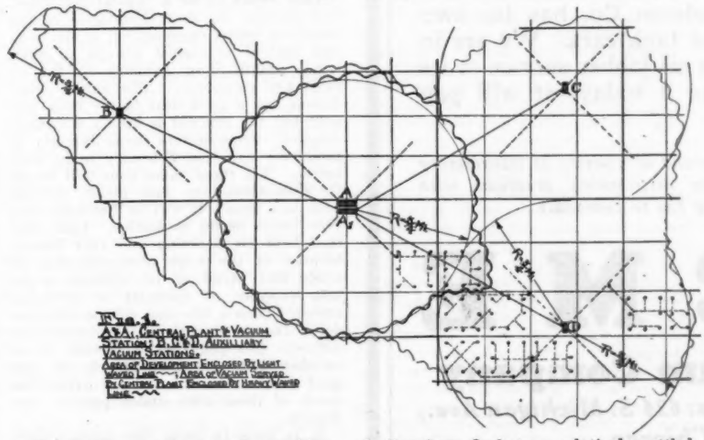


FIG. 1. A, A1, CENTRAL PLANT & VACUUM STATIONS; B, C & D, AUXILIARY VACUUM STATIONS. AREA OF DEVELOPMENT ENCLOSED BY LIGHT WAVED LINE ~~~; AREA OF VACUUM SERVICE BY CENTRAL PLANT ENCLOSED BY HEAVY WAVED LINE.

Let an area enclosed by the irregular line, be served by direct intake connection from compressors of A to wells in that area. This cannot be ideally realized, but as nearly as possible. Exceptions must have regard for lease boundary lines.

The limit of distance from A to the border of area to be so connected would seem at present to be about ¾ of a mile. The initial duty imposed upon B, C, and D may also embrace a gathering distance of about three-fourths mile radius. A total radius of 1½ miles from plant A may thus be reached on an assumed basis of atmospheric or slightly higher gathering pressure at the wells for an assumed volume of about 20,000,000 feet daily direct to plant, and another 15,000,000 to 20,000,000 feet daily from the boosters A, B and C, by use of main pipe diameters not exceeding 12-inch. Something like 6½ miles of 12-inch pipe can thus be made to serve a gathering capacity in such a case as outlined of 35,000,000 to 40,000,000 feet daily of flush gas and over a maximum gathering radius will within 2 miles or a total field reach of something under 5 miles, the ideal condition being around 4 miles only.

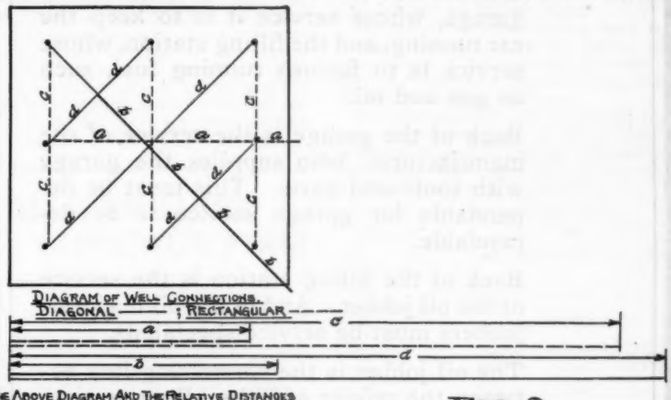


DIAGRAM OF WELL CONNECTIONS. DIAGONAL ; RECTANGULAR

THE ABOVE DIAGRAM AND THE RELATIVE DISTANCES LAID OUT TO THE SAME SCALE INDICATE THAT THE RECTANGULAR ARRANGEMENT MAY OFFER THE SHORTEST LINES OF WELL CONNECTIONS.

FIG. 2.

Alternative Method

The alternative method to serve the same purpose would call for as much as 4½ miles of pipe of 20-inch diameter, and the control of vacuum distribution would enter for consideration with very questionable factors to be handled during the decline from flush to a relatively settled gas volume.

The ratio of cost developed for main pipe alone for the case of the 20-inch against that of 12-inch would be somewhere around 34 to 18, or for a total cost comparison, in the case described, $183,000 to $95,000 for pipe material. And this would seem to justify the movement in the direction of dual installation of booster stations along with plant.

In Figure 1, A_1 indicates the vacuum of central plant and it may be installed at such time as condition of field justifies, and the dash lines, B, are shown connected to A_1 instead of A as they would be in the early performance of plant.

Central plant, with compressor cylinders designed to deliver gas at 30 pounds gauge pressure, will operate with permissible displacement efficiency down to a range of 15-inch mercury column vacuum. But in most instances, the preference of operators of plant and producers of oil will be to push the application of vacuum much beyond what would be to a reasonable degree the result of normal field decline of gas volume. In consequence compressors supplied for the purpose usually have the largest permissible displacement which can be applied for the case to be met, i.e., the initial and discharge pressure limits; and it is necessary, therefore, to see to it that the power equipment, almost invariably gas engines, have a good margin of excess power. This phase of the subject has, however, the attention of capable engineers in the interest of manufacturers of engines and compressors, and they are now well advised of the conditions and the demands likely to be made on their equipment and few mistakes are likely to occur between the purchaser and his power factor requirement, because manufacturers' representatives are quite ready and will usually insist on checking the conditions to be met and the selection of equipment to meet them.

Computing Power Required

In view of the fact, however, that many of the large oil companies who have been in the business of making natural gasoline for years have accumulated stocks of compressor cylinders which can be interchangeably used to vary displacement volumes and pressure ranges, it is well to be familiar with the designer's phase of the subject, at least to the extent of computing power required to compress and deliver gas for any pressure range demanded. Many practical engineers, well qualified otherwise have not had the advantage of mastery of this subject, insofar as these calculations are concerned.

Kent gives the formula which is most useful for ready application in terms of adiabatic compression. Adiabatic means without removal of the heat of compression during the compression), and the formula also takes no account of the clearance space in the compressor cylinder. It is, therefore, conservative and safe because some heat is removed by the cylinder walls and the amount of work computed in terms of cylinder dimensions is not actually accomplished.

The formula is:

(Continued on Page 222)

Action that Defines Service

Service is the one factor which keeps the automotive business alive. By that it is meant the service which helps a man buy his car and then helps him keep it and have the constant use of it.

However, the average car owner generally comes in touch with but two branches of this service. These are the garage, whose service it is to keep the car running, and the filling station, whose service is to furnish running fuel, such as gas and oil.

Back of the garage is the service of the manufacturer, who supplies the garage with tools and parts. This must be dependable for garage service to be dependable.

Back of the filling station is the service of the oil jobber. And in the oil business, jobbers must be service specialists.

The oil jobber is the connecting link between the refiner and the filling station. His service is to buy from the various refineries in large quantities and store the different oils in huge tanks from which he can quickly fill the filling station orders. This eliminates costly detail from the refiner's business and expensive, delayed buying from the retailer's.

Such service will be profitable to both retailer and dealer—it is the service of the Acme Petroleum Co.

The Acme Petroleum Co. has its own storage tanks and tank cars. We are in a position to give oil jobber service at its best. Investigate it today—it will pay you.

(This is the twenty-second of a series of informatory advertisements on the distribution problems with which the Oil Industry has to contend.)

ACME

Petroleum Company

Executive Offices: 624 S. Michigan Ave., Chicago

KANSAS CITY, MO. Land Bank Bldg.

DALLAS, TEXAS Magnolia Bldg.

OIL STORAGE PLANTS

Over 7,000,000 Gallons Storage

West Tulsa, Okla. Blue Island, Ill.

(*Chicago Switching District*)

RESALE GASOLINE CHICAGO FACTOR

More Potent at Present Than Refinery Product. Jobbers Not Buying. Demand Good for Higher Tests. Kerosene Fairly Firm. Distillates in Small Demand. Gas Oil Steady, Fuel Slow

By J. B. Waldo

CHICAGO, Feb. 21.—Resale gasoline is proving more potent than refinery gasoline at this time in this market. There is much of the resale gasoline being offered by jobbers as well as marketers. One case is of a seller who called a customer on the long distance Friday in search of a possible order. The customer said he had six cars on the track and he hated to pay so much demurrage. He suggested the concern that wanted to sell him more gasoline and had actually sold him all of this oil on the track should try and move at least three of the cars. When asked the price wanted the owner said the marketer knew the price he paid for the gasoline and to try and get him a little profit if possible. The marketer stated that the highest price the jobber had paid for any gasoline bought from them was 10½ cents for Navy and that this meant a price of 11 cents would move the goods. It would seem possible to get such a price but of course there would have to be some short haul freight charges added.

Everybody in the gasoline marketing business in Chicago is inclined to blame the present soft condition to a sale made by the Indian Refining Co., of a quantity of gasoline at a price out of Lawrenceville about equal to 12¼ cents out of Group 3. The quantity of gasoline sold is estimated at 200 to 400 cars and they were rather widely distributed. The sale was for February delivery. At the time of the Peoria meeting five marketers and one refinery representative went down together to see what business they could do and the refinery man says the five salesmen in the party for marketers all had gasoline out of Lawrenceville for sale, all knew just what the other fellow paid for his and there was a fine chance of anyone making any money. Reports from various salesmen at the meeting concur that not a car of gasoline was sold at that session, at least they all say "I know I did not sell any."

Thinking of Last Year

This seems to be a typical condition. One answer is that February is the month of lowest consumption in the year and that it is almost always a much worse month than January so far as sales are concerned. The outside conditions are a good deal better than last year but the demand is still a February demand. Some dealers found January so good they expected February to be even better. Yet these same men will admit the conditions are just about parallel with last year. It was in February last year prices began to decline. Last year they kept on declining and very largely because of the huge overproduction of crude that permitted the refiners to obtain supplies of material at declining prices. Then a late and cold spring hindered the consumption. Conditions are different this year but it is well to remember February and March are not good gasoline months and not expect too much of them even under present conditions.

It is hard to judge the market right now. With anything like a normal demand 200 cars or twice that quantity would not do more than ripple the market and in a few days the only result would be regrets of some that they did not buy. The jobbers are not buying and their views as announced are so much below the present market that any business with them until they change their minds is impossible. One large buyer cautioned a friend in the marketing business to "watch his step in gasoline," saying he expected to buy all the gasoline he wanted during March at 11 cents. His friend thought he must have misunderstood him and asked if he heard correctly at 11 cents and the jobber said, "Yes I said 11, not 12 or 13 cents." Of course the jobbers complain that refiners have taken all of the tank wagon advance. These jobbers insist they must have some of it and show how they are losing money if they buy at the present market. Motors gasoline bought in Oklahoma at 13¼ cents costs laid down at Chicago 15⅝ cents. The tank wagon is really the quantity price for over 100 gallons or 18 cents. Now 2¼ cents is undoubtedly a small margin but little is sold by distributors at that price as the consumers are supplied by a very large percentage at the filling stations at 21 cents. So long as the demand is at the February level there will be a lot of this arguing and pulling and hauling regarding prices. The matter will have to be adjusted.

The demand is still good for the higher tests although the total is so limited it is good by comparison not in quantity. The prices of these are also rather easy and the situation unsettled. The supply of 60-62, 440 end point is smaller than either the 58-60 or the 64-66 gravities. The present mild weather should favor the sale of the 437 end point gasoline. It is really a very mild season and may mean an early spring generally but not right in Chicago which has no spring until June. Natural gasoline continues to be very strong here and the higher gravities are scarce. The spot market seems to be bare of natural gasoline although prices show no increase this week. Blends are very little traded in here and the offerings are light.

Kerosene Not So Strong

Kerosene is fairly firm although perhaps not quite as strong as a week ago. The demand is fair for the season and several larger distributors are making contracts for quantities for their spring demand. There is really nothing to be said regarding the situation, except that the jobbers expect to have a good spring season.

Small Distillate Demand

There is only a small demand for distillates. The weather is mild and little fuel is being consumed. These automatic plants are excellent weather reporters. The oil burners make their best records in weather when only a little fire is needed as they do not waste heat but give just enough to preserve the stated temperature and then go out of business while coal and coke smolders along. There is a lot of discussion regarding what was done last winter. The very general impression one gets from talking with oil men who have supplied burner users with fuel is that the burners are still capable of a good deal of improvement. One distributor stated he had tried three grades of distillate and had trouble with all. The burner people blame the oil men for not furnishing the right kind of fuel. Some oil men are very strong in their disapproval of the tactics of some distributors who it is claimed have hurt the entire industry by furnishing poor fuel oil. One concern is charged with selling a mixture of Smackover crude and distillate for oil burners which could not possibly work. One oil man said such concerns should be forced to go round and clean their customers' tanks for they were left with a lot of settlings that surely would give trouble when filled again as the pump barrel necessarily extends to a point very close to the bottom of the tank. Prices are distinctly easy and are kept up partly because the sellers figure that a distillate is worth more and must bring more than gas oil, forgetting that gas oil is useful for more purposes than a distillate. For one thing the average cracking plants and probably all of them will get more gasoline from gas or a heavier oil than from distillate. It is the fraction between gas oil and kerosene that must furnish the fuel for

the present domestic oil burners. The trouble is to get enough of that grade. Probably a burner will be developed in time that will break up the heavier oils and burn them clean even in cold weather which is the test of the oil burner, not what it will do spring and fall.

Gas Oil Steady

Gas oil is in fairly good demand and the market is just about steady. Some refiners have no gas oil for the dealers and it is assumed here there is more gas oil being cracked than when the demand for gasoline was less active. On the other hand the demand is shrinking for use as burner fuel and also for use in such industries as turn from fuel oil to gas oil with cold weather. There has been a strong demand for a zero gas oil and some sold as such has disappointed its users. Judging by this season next year will see a demand for a real zero test gas oil that will give it a real price. It is hard to tell just what the demand from the burner users next season will be. Of course there are the present installations which will want distillate of a good quality as a rule but there may be some new developments in the burners that will enable them to use a heavier oil. Possibly something will be done in the way of automatic pre-heating. The convention of burner manufacturers to be held in this city at the opening of April may have some advanced designs in burners that will solve the problems which confront the oil industry.

Fuel Oil Slow

Fuel oil is selling very slowly at present and the trade here is unable to account for this condition except on the theory of a buyers' strike. Several of the largest consumers who have not placed advance contracts claim the market is distinctly easier and prices will go lower. There is commonly little heavy buying, that is in an average season, after the first of March and this appears to be less active than an average season. Sellers expect or at least hope for further advances in Mid-Continent crude while buyers say there is no chance, all of which is largely influenced by the side of the fence each occupies. The last crude advance undoubtedly checked a decline in prices but the market has sagged and today $1.35 would be a top selling price with some business doing at less. Reports from Detroit are not encouraging as to increased demand from the auto companies. The steel companies are taking about all they will as the Western plants are running as close to capacity as it is possible for them to do. In the East the situation is not so good as the mills are less well employed. The chief activity comes from the building lines and the projects outlined on paper for new constructions are high but it is hardly possible all of these will be realized. For one thing bankers are reducing their ideas regarding the limit on new valuations although they will lend 60 per cent on old valuations. A decided falling off in building activities would be felt in the steel and indirectly in the fuel oil industry. Smackover crude is now worth $1.30 at the wells and there is every indication of a short supply if the same amount continues to go south. Some Smackover fuel on tracks can be had at around $1.25 but when this is cleaned up and the old contracts based on lower crude costs are filled, dealers claim the price cannot be less than $1.30. This would seem to be the situation so long as so large a percentage of the crude is being piped to the Gulf Coast or shipped in tank cars.

Lubricants More Active

Lubricating oils have been much more active recently in buying by the jobbing trade. Last month was quiet but the distributors are stocking up to avoid paying higher prices. Several of the largest national distributors of lubricating oils and greases have stated that advances impended, among them being the Vacuum, Tide Water and others. This is very likely to be "sales tank," not official, but the buyers have believed it. So far as known here the new prise lists by these companies have not been issued. Western refiners report a large business doing both in sales to compounders and export organizations and they have marked up the tank car prices from 1 to 3 cents and in some special items even more. Bright stocks, of course, are wanted largely. There is a steady call for steam cylinder stocks. The industrial demand is steady but not as large as some hoped it would be but the season is still young. Keen competition for the local business is reported.

Tank Wagon Unchanged

Tank wagon prices in this territory have not been changed since the advance of 2 cents on gasoline and 1 cent on refined oil on February 13. The sense of leaders is that these prices are very likely to "hold for a while." The distribution is good although there has been some slowing down in the country districts with the advent of bad roads which came with the warm weather. Heavy snows in the lake region and extending west to the Missouri in parts of the territory also have made auto traffic slow and reduced consumption. With the present range of tank wagon and refinery prices cutting would seem unlikely, yet reports are made of considerable activity by price cutters. A report received from Detroit complains that a nation-wide distributor is making a confidential price 3 cents under the regular tank wagon price and that unless this is stopped there will be trouble. From other points in the territory come reports of minor cuts by rather important oil companies always "to meet competition." There is more or less of this price cutting through contracts and the like and the larger companies as a rule shut their eyes to it. The real trouble is there are so many filling stations that there is not the same amount of business done by each as formerly and in attempts to "get their share of the sales" inducements are offered which are really price reductions although they may masquerade as rebates for advance purchase of coupons or quantity prices or a dozen other matters. There is also complaint of the freedom with which some companies give away pumps, tanks and other equipment. Keen competition is back of it all. It would seem impossible that price cutting is not done except through low costs for gasoline either on old contracts or disregard by refiners of the actual cost to refine. The falling off in business per station results in an automatic increase in the overhead percentage that must be charged against every gallon of gasoline sold. Oldtimers in the business say there was more money at the former spread of 1 cent than there is today with the 2 cents spread simply because of the larger volume. The head of one oil company says it made more money in the old times because the boys were busy selling all the time. Now he says they have nothing to do half their time.

GASOLINE CONSUMPTION INCREASES; EASTERN MARKETS CONTINUE FIRM

By N. O. Fanning

NEW YORK, Feb. 21. — The eastern refined oil markets maintained a firm tone during the past week. The feature of the week was a report that the Standard Oil Co. of New York would increase the tank wagon price of gasoline 2 cents per gallon to 23 cents. There were no actual changes in the tank wagon market, however, up to Saturday.

Consumption of gasoline has shown a material increase during the last two weeks, and refiners are having a difficult time to build up stocks for the spring, despite the fact that refinery operations have increased between 5 per cent and 10 per cent. The big marketers are short of gasoline for current requirements and are buying in the open market. They have discontinued quoting spot gasoline here. The last sale reported was at 18 cents per gallon, an advance of 1 cent since the first of the month.

The outlook now is for higher prices not only for gasoline and crude petroleum, but other petroleum products. The price increases have not yet brought any increase in crude production, although there has been a speeding up of refinery operations with a resultant gain in refined oil output. Premiums of 25 cents per barrel or more are reported to have been paid for high grade crude and this is looked upon here as being a forerunner of higher posted quotations.

The demand for gasoline here is such as to promise a continued strain on marketers for the remainder of the year. It is not likely that the market will be flooded with cheap gasoline, inasmuch as the large stocks now on hand are in strong hands, and it is understood small refiners cannot procure crude at prices which would enable them to undersell the big fellows.

Conservation Evident

Despite the acknowledged outlook for higher prices there are many oil men who express the opinion that further advances will hurt the oil business by ultimately bringing about overproduction. Furthermore, they fear the new series of investigations now being planned will have an adverse effect from the viewpoint of public opinion.

It is believed by many, however, that prices should be advanced now to any level which will cause an almost immediate gain in output. They say that this will result in lower prices for natural reasons, without any artificial manipulation.

In the highest circles, however, higher prices are looked upon as the only manner in which production can be stimulated to any extent, and therefore it would not be surprising to see a continuation of the upward movement for some time to come.

Kerosene Steady

The best that can be said for the kerosene situation is that prices are steady and the demand is holding up fairly well. Price advances have been expected but so far have failed to materialize. It is reported a large export sale of kerosene was made at 8 cents per gallon f.o.b. an Atlantic port, which is 1½ cents higher than the current posted quotation. This indicates the real situation in the market at present. Kerosene cannot be had at New York in bulk for less than 9 cents.

Diesel Oil

Diesel oil consumption here is increasing as a larger number of vessels are in commission equipped with Diesel engines. The abrupt rise in quotations about a month ago to $2.70 per barrel has not restricted the demand in the least. It is said authoritatively that a Diesel engine burns only half as much as a steam engine fired with oil burners, so that it appears natural Diesel oil should sell considerably higher than bunker oil, which is quoted at $1.80 per barrel.

The boom that has been given Diesel propulsion in the last month bids fair to bring about an almost revolutionary change in the oil business as well as in shipping. Articles are appearing in numerous reliable trade journals pointing out the value of the Diesel engine and the newspapers are filled with stories regarding progress being made in the perfection of Diesel engines not only for ships, but for railway locomotives and automobiles.

Inasmuch as Diesel engines burn a limited amount of oil, the demand is not likely to increase to an extent which would prevent the oil business from being prepared. But oil refiners are alive to the need for a large reserve production to take care of any emergency.

Lubricating oils have been quiet. The only price increase reported during the week was an advance of 1 cent per gallon in the price of No. 1 summer black to 19 cents per gallon. Red oils remain unchanged despite advances of 2 cents in red oil prices in the Gulf Coast district during the past two weeks.

Cylinder stocks also remain unchanged. Prices are now looked upon as on high levels, and refiners seem satisfied to let well enough alone. However, with advances in the Mid-Continent and Gulf Coast, an upward readjustment is considered inevitable before long.

Export Market Improves

There was a noticeable improvement in the export market during the past week. Kerosene shipments took a considerable jump, amounting to more than 6,000,000 gallons during the week. Case exports alone amounted to 3,396,570 gallons. Case shipments of gasoline were in fair volume, also, aggregating 1,479,880 gallons.

Although the movement of oil products for export has been below normal for some weeks, oil exporters point out that exports from the Gulf Coast in bulk are at much higher rate, and they say the lull here is seasonal. Several bulk cargoes have been sold recently for delivery in March and April.

One of the principal consignments of kerosene to go out from New York last week consisted of 167,000 cases of kerosene destined for British India.

The tanker Superga carried a cargo to Belgium containing 1,842,741 gallons of kerosene and 727,105 gallons of gasoline. The only other bulk shipments was one of 1,135,789 gallons to Egypt.

The following table shows principal exports of petroleum and petroleum products from New York reported during the past three weeks (figures in gallons unless otherwise stated in parentheses):

Item, How Shipped—	Week ended— Feb. 18	Feb. 11	Feb. 4
Gasoline:			
Bulk	727,105	.....	.....
Cases	1,479,880	1,142,960	1,858,020
Kerosene:			
Bulk	2,978,530	.....	.....
Cases	3,396,570	1,228,280	973,321
Fuel oil:			
Bulk	.....	269,063	.....
Lub. oil:			
Bulk	.....	.....	1,485,087
Barrels	998,000	1,519,550	2,150,200
Cases	170,430	97,170	133,540
Lub. grease:			
Barrels (bbls.)	.....	4,422	.....
Paraffin wax:			
Bags (lbs.)	908,160	937,200	682,440
Barrels (bbls.)	.....	2,541	.....
Crude oil:			
Barrels (bbls.)	2,585	5,800	3,316

Tanker Charters

New fixtures in the tanker chartering market during the week included the following:

Tanker Vaba (Am.), crude petroleum, Gulf to Trieste, March loading, at 35 shillings.

Tanker Atlantic Sun (Am.), two trips, March, Gulf to north Atlantic, refined oil, at 50 cents per barrel.

Tanker Rudolph Albrecht (Ger.), March loading, refined oil, Philadelphia to Copenhagen, at 30s. 6d.

Tanker Ostpreussen (Ger.), March-April, lubricating oil, Gulf to Ghent, 39 shillings.

Tanker Cape Henlopen (Am.), March loading, crude petroleum, Gulf to north Atlantic, 29 cents.

Tanker La Habra (Nor.), Gulf to three ports of United Kingdom, at 38 shillings, March loading.

Tanker Cassimir (Am.), February loading, crude, Port Aransas to New York, at 40 cents.

Tanker Huguenot (Am.), crude petroleum, Gulf Coast to Hamburg, 60,000 bbls., at 24s., with adjustment for less than full cargo.

Tanker Weehauken (Br.), March-April loading, Gulf to three ports United Kingdom, basis 34s., one port.

Tanker Pearlshell (Am.), cargo kerosene, Phliadelphia to French Atlantic, February loading.

Oil Receipts Decline

Receipts of crude and refined oil at Atlantic Coast ports during the week ended February 18 averaged 443,000 bbls. daily., against 485,000 bbls. daily the preceding week. Despite the decline of 42,000 bbls., receipts from the Gulf Coast showed a gain amounting to 316,000 bbls. daily, against 277,000 the week before.

Fall River Uses Venezuelan Oil

The Fall River refinery of the New England Oil Refining Co. is understood to be running partly on Venezuelan crude, which is being shipped regularly from Aruba by the Lago Petroleum Co. of Venezuela. The New England company

(Continued on Page 211)

REFINERY AND CRUDE PRICES

Quotations on Principal Refined Products and Crude Petroleum Markets in All the American Oil Fields

GASOLINE AND NAPHTHA

	Feb. 24		Feb. 17		Feb. 10	
OKLAHOMA (Group 3)—						
50-52 450 end point (Naphtha)	.12¼	.12½	.12½	.12¾	.11¼	.11½
56-58 450 end point	.12¾	.13	.13	.13¼	.11½	.12
58-60 437 end point (U. S. Motor)	.13	.13¼	.13¼	.13½	.12	.12¼
60-62 400 end point	.14½	.14¾	.14¾	.15	.13½	.13¾
64-66 375 end point	.15¾	.16	.16	.16¼	.15	.15¼
68-70 350 end point	.16¼	.16½	.16¼	.16½	.15¼	.15½
KANSAS—						
58-60 437 end point (U. S. Motor)	.13¼	.13½	.13½	.13¾	.12¼	.12½
NORTH TEXAS—						
48-52 450 end point (Naphtha)	.12	.12¼	.12¼	.12½	.11¼	.11½
50-52 440 end point (Naphtha)	.12¼	.12½	.12½		.11½	.11¾
56-58 450 end point	.12½	.12¾	.13	.13½	.11½	.12
58-60 437 end point (U. S. Motor)	.13	.13¼	.13½	.13¾	.12¼	.12½
60-62 400 end point	.14½	.14¾	.14¾	.15	.14	.14¼
64-66 390 end point	.16		.16	.16¼	.14¾	.15
64-66 375 end point	.16	.16¼	.16¼	.16½	.15¼	.15½
68-70 360 end point	.16¼	.16½	.16½	.16¾	.15½	.15¾
NORTH LOUISIANA—						
56-58 450 end point	.12½	.13	.12½	.13	.11¾	.12
58-60 437 end point (U. S. Motor)	.13¼	.13½	.13¼	.13½	.12¼	.12½
60-62 400 end point	.14½	.14¾	.14½	.14¾	.13½	.13¾
64-66 390 end point	.15½	.15¾	.15¾	.16	.15	.15¼
64-66 375 end point	.16½	.16¾	.16¾	.17	.16	.16¼
ARKANSAS—						
58-60 450 end point	.13½	.13¾	.14	.14¼	.12½	.12¾
58-60 437 end point (U. S. Motor)	.13¾	.14	.14¼	.14½	.12¾	.13
64-66 375 end point	.16¾	.17	.17¼	.17½	.15½	.15¾
ROCKY MOUNTAIN STATES—						
*58-60 437 end point (U. S. Motor)	.16¼	.16½	.16¼	.16½	.15¼	.15½
PENNSYLVANIA—						
52 Naphtha	.14½		.14½		.13½	
54 Naphtha	.14¾		.14¾		.13¾	
56 Gasoline	.15¼		.15¼		.14¼	
58 Gasoline	.15¾		.15¾		.14¾	
60 Gasoline	.16¼		.16¼		.15¼	
62 Gasoline	.16½		.16½		.15½	
64 Gasoline	.17		.17		.16	
66 Gasoline	.18½		.18½		.17	
68-70 Gasoline	.19		.19		.18¾	
CALIFORNIA—						
54-56 437 end point (U. S. Motor) domestic	.11	.11½	.11	.11½	.11	.11½
CHICAGO DIST. (Based on Group 3)—						
50-52 450 end point (Naphtha)	.12¼	.12½	.12½	.13	.11	.11¼
56-58 450 end point	.12½	.13	.12¾	.13	.11¼	.11½
58-60 437 end point (U. S. Motor)	.13	.13¼	.13¼	.13½	.12	.12¼
60-62 400 end point	.14½	.14¾	.14½	.15	.13½	.13¾
64-66 375 end point	.15¾	.16	.16¼	.16½	.15	.15¼
68-70 360 end point	.16¼	.16½	.17	.17¼	.15½	.15¾

*Colorado points.

NATURAL GASOLINE

	Feb. 24		Feb. 17		Feb. 10	
OKLAHOMA (Group 3)—						
Grade Double A, 80-87.9, 375 e.p., rec. 90%	.13	.13¼	.13	.13½	.11½	.11¾
Grade A, 72-79.9, 375 end point, rec. 90%	.13¼		.13	.13½	.11¾	
Grade Double B, 84-92, 375 e.p., rec. 95%	.12¼	.12½	.12¼	.12½	.11	.11¼
Grade B, 76-83.9, 375 end point, rec. 85%	.12¼	.12½	.12¼	.12½	.11	.11¼
Grade C, 80-90, 375 end point, rec. 78%	.11½	.11¾	.11½	.11¾	.10¾	
NORTH TEXAS—						
Grade Double A, 80-87.9, 375 e.p., rec. 90%	.13	.13¼	.13	.13¼	.11¾	
Grade A, 72-79.9, 375 end point, rec. 90%	.13	.13¼	.13	.13¼	.11¾	
Grade Double B, 84-92, 375 e.p., rec. 85%	.12	.12½	.12¼	.12¾	.11	.11¼
Grade B, 76-83.9, 375 end point, rec. 85%	.12	.12½	.12¼	.12¾	.11	.11¼
Grade C, 80-90, 375 end point, rec. 78%	.11½	.11¾	.11½	.11¾	.10½	.10¾
NORTH LOUISIANA—						
Grade A, 72-79.9, 375 end point, rec. 90%	.15		.15		.14	
Grade C, 76-82, 375 end point, rec. 85%	.13		.13		.12	
CALIFORNIA—						
68-80 absorption, 360-390 end point	.13½	.14	.13½	.14	.13½	.14
78-84 compression, 350 end point	.13¾		.13¾		.13¾	
CHICAGO DIST. (Based on Group 3)—						
Grade Double A, 80-87.9, 375 e.p., rec. 90%	.13	.13½	.13	.13¼	.11¼	.11½
Grade A, 72-79.9, 375 end point, rec. 90%	.13¼	.13½	.13¼	.13½	.11½	.11¾
Grade Double B, 84-92, 375 e.p., rec. 85%	.12¼	.12½	.12¼	.12½	.10¾	.11
Grade B, 76-83.9, 375 end point, rec. 85%	.12¾	.12½	.12½	.12¾	.11	.11¼
Grade C, 80-90, 375 end point, rec. 78%	.11	.11¾	.11¾	.12	.10½	.10¾

MOTOR NATURAL GASOLINE (BLEND)

	Feb. 24		Feb. 17		Feb. 10	
OKLAHOMA (Group 3)—						
60-62 450 end point	.12¾	.13	.12¾	.13	.11¾	.12
64-66 437 end point	.13		.13		.11¾	.12
68-70 430-435 end point	.13		.13		.11¾	.12
NORTH TEXAS—						
58-62 440 end point	.12¾	.13	.12¾	.13	.12	
58-60 450 end point	.13		.13		.12	
PENNSYLVANIA—						
*60-62	.15½		.15½		.14¾	
*64-68	.15½		.15½		.14¾	
*66-68	.15¾		.15¾		.14¾	
*68-70	.15¾		.15¾		.14¾	
CHICAGO DIST. (Based on Group 3)—						
60-62 450 end point	.12½	.13	.12¾	.13	.11½	.11¾
64-66 450 end point	.12¾	.13	.12¾	.13	.11½	.11¾
68-70 437 end point	.13¼	.13½	.12¾	.13¼	.11¾	.12

*At Sistersville, W. Va.

BURNING OIL

	Feb. 24		Feb. 17		Feb. 10	
KANSAS—						
41-43 water white Kerosene	.05½	.05¾	.05½	.05¾	.04¾	.04⅞
NORTH LOUISIANA—						
41-43 prime white Kerosene	.05¾	.06	.05	.05¼	.05	
42-44 water white Kerosene	.06	.06¼	.05¼	.05½	.05¼	
OKLAHOMA (Group 3)—						
41-43 water white Kerosene	.04¾	.05	.04¾	.05¼	.04¼	.04⅝
42-44 water white Kerosene	.05¼		.05¼	.05½	.04⅝	.04¾
40-41 prime white Kerosene	.04¾	.04⅞	.04¾	.04⅞	.04⅝	.04¾
ROCKY MOUNTAIN STATES—						
*40-42 water white Kerosene	.07¾	.08	.07¾	.08	.07½	.07¾
NORTH TEXAS—						
41-43 water white Kerosene	.04¾	.05	.04¾	.05	.04⅜	.04⅝
40-42 prime white Kerosene	.04½	.04¾	.04½	.04¾	.04⅛	.04⅜
41-43 prime white Kerosene	.04½	.04¾	.04½	.04¾	.04⅛	.04⅜
42-44 water white Kerosene	.05	.05¼	.05	.05¼	.04⅝	.04¾
ARKANSAS—						
41-43 water white Kerosene	.05½	.05¾	.05¾	.06	.05	.05¼
42-44 water white Kerosene	.05¾	.06	.06	.06¼	.05¼	.05½
PENNSYLVANIA—						
43 Kerosene prime white	.07½		.07½		.07¼	
45 Kerosene water white	.07¾		.07¾		.07½	
46 Kerosene water white	.08¼		.08¼		.08¼	
47 Kerosene water white	.08¾		.08¾		.08½	
34 Neutral	.08¾		.08¾		.08¾	
34 Sundebloomed Neutral	.10		.10		.10	
36 Miners' Neutral	.08		.08		.08	
300 Mineral Seal	.08		.08		.08	
CALIFORNIA—						
40-42 water white (high burning test)	.07½	.08	.07½	.08	.07½	.08
Engine distillate, 43-45 445 end point	.08½	.09	.08½	.09	.08½	.09
Engine distillate, 42-44 480 end point	.07¾	.08	.07¾	.08	.07¾	.08
CHICAGO DIST. (Based on Group 3)—						
41-43 water white Kerosene	.05	.05¼	.04⅞	.05	.04¼	.04¾
42-44 water white Kerosene	.05¼	.05½	.05	.05¼	.04⅝	.05

*Colorado points.

FUEL OILS

	Feb. 24		Feb. 17		Feb. 10	
KANSAS—						
24-26 Fuel Oil	1.45	1.50	1.45	1.50	1.50	1.55
32-36 Gas Oil	.03¾	.03⅞	.03¾	.03⅞	.03⅜	.03¾
38-40 Distillate	.04		.04	.04¼	.04⅛	.04¼
OKLAHOMA (Group 3)—						
22-26 Fuel Oil (sellers' cars)	1.27½	1.30	1.27½	1.32½	1.30	1.35
24-26 Fuel Oil (buyers' cars)	1.25	1.30	1.27½	1.32½	1.30	1.35
24-26 Fuel Oil (sellers' cars)	1.30		1.30	1.35	1.32½	1.35
28-30 Fuel Oil (sellers' cars)	1.35	1.40	1.40	1.45	1.40	1.45
32-36 Gas Oil	.03¾	.03⅞	.03¾	.03⅞	.03⅜	.03⅝
36-38 Distillate	.03¾	.03⅞	.03¾	.03⅞	.03⅜	.03⅝
38-40 Straw distillate	.03⅞	.04	.04		.04	.04¼
NORTH TEXAS—						
24-26 Fuel Oil (sellers' cars)	1.40	1.45	1.40	1.45	1.40	1.50
26-30 Fuel Oil	1.45	1.50	1.45	1.50	1.50	1.55
32-36 Gas Oil	.03¾	.03⅞	.03¾	.03⅞	.03⅜	.03⅝
36-38 Distillate	.03¾	.03⅞	.03¾	.03⅞	.03⅜	.03⅝
38-40 Straw distillate	.04		.04		.04	.04¼
NORTH LOUISIANA—						
18-20 Fuel Oil	1.30	1.35	1.30	1.35	1.40	1.45
32-36 Gas Oil	.04		.04		.04	.04¼
ARKANSAS—						
38-40 Distillate	.04	.04¼	.04¼		.04¼	.04½
32-36 Gas Oil	.04		.04	.04¼	.04	.04¼
22-26 Refinery Fuel Oil	1.30		1.30	1.35	1.30	1.35
GULF COAST (South Texas)—						
Gas oil	.05	.05½	.05	.05½	.04½	.05
Fuel Oil	1.70	1.80	1.70	1.80	1.65	
PENNSYLVANIA—						
30-34 Fuel Oil	.06¼		.06¼		.06¼	
36-40 Fuel Oil	.07		.07		.07	
CALIFORNIA—						
33-36 Distillate	.04¾	.05	.04¾	.05	.04¾	.05
27-33 Distillate	.04½	.04¾	.04½	.04¾	.04½	.04¾
15-20 Fuel Oil (at tide water)	1.60	1.65	1.60	1.65	1.60	1.65
CHICAGO DIST. (Based on Group 3)—						
24-26 Fuel Oil (sellers' cars, Group 3)	1.30	1.35	1.30	1.35	1.30	1.35
22-24 (El Dorado)	1.30	1.35	1.30	1.35	1.30	1.35
18-20 (Smackover)	1.25	1.30	1.25	1.30	1.25	1.30
32-36 Gas Oil	.03¾	.03⅞	.03¾	.04	.02½	.02⅝
36-38 Distillate	.03¾	.03⅞	.03¾	.03⅞	.03¾	.04
38-40 Straw distillate	.03⅞	.04	.03⅞	.04	.03⅜	.04¼

LUBRICATING OILS AND WAX

	Feb. 24		Feb. 17		Feb. 10	
OKLAHOMA (Group 3)—						
Neutrals:						
70-80 vis., 2½ color, 20-25 cold test	.07	.07½	.06	.06½	.06	.06¼
100 vis., 2 color, 20-25 cold test	.08½	.09	.07½	.08	.07½	.08
100 vis., 3 color, 2-25 cold test	.08	.08½	.07	.07½	.07	.07½
150 vis., 3 color, 20-25 cold test	.09½	.10	.08½	.09	.08½	.09
150 vis., 4 color, 20-25 cold test	.09¼	.09¾	.08¼	.08¾	.08¼	.08¾
180 vis., 4 color, 23-28 cold test	.10	.10½	.09	.09½	.09	.09½
180 vis., 3 color, 23-28 cold test	.10¼	.10¾	.09¼	.09¾	.09¼	.09¾
200 vis., 3 color, 23-28 cold test	.11¾	.12¼	.10¾	.11¼	.10¾	.11¼
200 vis., 4 color, 23-28 cold test	.11½	.12	.10½	.11	.10½	.11
220 vis., 3 color, 25-30 cold test	.14	.14½	.13	.13½	.13	.13½
220 vis., 4 color, 25-30 cold test	.13½	.14	.12½	.13	.12½	.13
240 vis., 3 color, 25-30 cold test	.15½	.16	.14½	.15	.14½	.15
240 vis., 4 color, 25-30 cold test	.15	.15½	.14	.14½	.14	.14½
280 vis., 3 color, 25-30 cold test	.18½	.19	.17½	.18	.17½	.18
280 vis., 4 color, 25-30 cold test	.17½	.18	.16½	.17	.16½	.17
Red Neutrals:						
180 vis., 5 color, 23-28 cold test	.09¾	.10¼	.08¾	.09¼	.08¾	.09¼
180 vis., 6 color, 23-28 cold test	.14½	.15	.13½	.14	.13½	.14
200 vis., 5 color, 23-28 cold test	.11¼	.11¾	.10½	.10¾	.10¼	.10⅝
200 vis., 6 color, 23-28 cold test	.15½	.16	.14½	.15	.14½	.15
220 vis., 5 color, 25-30 cold test	.13	.13½	.12	.12½	.12	.12½
220 vis., 6 color, 25-30 cold test	.17¼	.17¾	.16¼	.16¾	.16¼	.16⅝
240 vis., 5 color, 25-30 cold test	.14½	.15	.13½	.14	.13½	.14
240 vis., 6 color, 25-30 cold test	.18¼	.18¾	.17¼	.17¾	.17¼	.17⅝
280 vis., 5 color, 25-30 cold test	.16½	.17	.15½	.16	.15½	.16

REFINERY AND CRUDE PRICES

Quotations on Principal Refined Products and Crude Petroleum Markets in All the American Oil Fields

Cylinder Stocks—						
180-200 vis., S. R. green, 40-45 cold test	.10½	.11	.10½	.11	.08½	.09
180-200 vis., S. R. green, 40-45 cold test	.10	.10½	.10	.10½	.08½	.09
170-190 dark green, 40-45 cold test	.08	.09	.08	.09	.06½	.07
600, E filtered	.21½	.22½	.20½	.21½	.20½	.21½
190-200 vis. @ 210 "D" Bright Stock	.36		.35		.35	
200-210 vis. @ 210 "E" Bright Stock	.31		.30		.30	
150 vis. @ 210 "D" Bright Stock	.32		.31		.31	
150 vis. @ 210 "E" Bright Stock	.28		.27		.27	
Waxes:						
124-126 White Crude Scale Wax	.05⅛	.05¼	.05¼	.05⅜	.05¼	.05⅜
PENNSYLVANIA—						
150, 3 color	.22		.22		.22	
180, 3 color	.24½		.24½		.24½	
200, 3 color	.26		.26		.26	
220, 3 color	.28½		.28½		.28½	
600, steam refined	.23½		.23½		.23¼	
635, steam refined	.28½		.28½		.28½	
650, steam refined	.31		.31		.38½	
600, Pennsylvania flash	.35		.35		.35	
630, Pennsylvania flash	.40		.40		.39½	
*550, E filtered	.24		.24		.24	
*600, E filtered	.27½		.27½		.27½	
600, E filtered	.26½		.26½		.26½	
600, D filtered	.32½		.32½		.32½	
550, E filtered	.23		.23		.23	
550, D filtered	.27		.27		.27	
Pennsylvania Bright Stock	.40½		.40½		.40½	
†122-124 White Crude Scale Wax	.05⅝		.05⅝		.05⅝	
†122-124 White Crude Scale Wax	.05⅞		.05⅞		.05⅞	
GULF COAST (South Texas)—						
Zero Black	.07	.08	.07	.08	.06½	.07
No. 2 color, 100 vis., pale oil	.10½	.11½	.10½	.11½	.09½	.10½
No. 2 color, 150 vis., pale oil	.12	.13	.12	.13	.11	.12
No. 3 color, 200 vis., pale oil	.15	.16	.15	.16	.14	.15
No. 3 color, 300 vis., pale oil	.17	.18	.17	.18	.16	.17
No. 3½ color, 500 vis., pale oil	.19	.20	.19	.20	.18	.19
No. 3½ color, 750 vis., pale oil	.24½	.25½	.24½	.25½	.23½	.24½
No. 4½ color, 1200 vis., pale oil	.27½	.28½	.27½	.28½	.26½	.27½
No. 4½ color, 2000 vis., pale oil	.31	.32	.31	.32	.30	.31
No. 2 plus color, 150 vis., pale filtered	.23½		.23½		.22½	
No. 2 plus color, 200 vis., pale filtered	.25		.25		.24	
No. 2½ minus color, 300 vis., pale filtered	.28½		.28½		.27½	
No. 2½ color, 500 vis., pale filtered	.32½		.32½		.31½	
No. 2½ color, 800 vis., filtered	.42½		.42½		.41½	
No. 5 to 6 color, 200 vis., red oil	.13½	.14½	.13½	.14½	.12½	.13½
No. 5 to 6 color, 300 vis., red oil	.15½	.16½	.15½	.16½	.14½	.15½
No. 5 to 6 color, 500 vis., red oil	.17½	.18½	.17½	.18½	.16½	.17½
No. 5 to 6 color, 750 vis., red oil	.22½	.23½	.22½	.23½	.21½	.22½
CALIFORNIA—						
200 vis., 2½-3 color	.14½	.15½	.14½	.15½	.14½	.15½
300 vis., 2 -4 color	.16	.17	.16	.17	.16	.17
350 vis., 3½-4 color	.17½	.18½	.17½	.18½	.17½	.18½
400 vis., 4 -4½ color	.19	.20	.19	.20	.19	.20
Red Neutrals:						
200 vis., 4½-5 color	.13	.14	.13	.14	.13	.14
300 vis., 5 -6 color	.14	.15	.14	.15	.14	.15
400 vis., 5 -6 color	.16	.17	.16	.17	.16	.17
500 vis., 6 -6½ color	.17	.18	.17	.18	.17	.18
600 vis., 6½ plus color	.18	.19	.18	.19	.18	.19

*At Warren, Pa. †At New York City.

Note: Bright stocks are not manufactured commercially on the Pacific Coast.

NEW YORK DOMESTIC MARKET

Bayonne Refinery Prices:	Feb. 24	Feb. 17	Feb. 10
U. S. Motor Gasoline, 58-60 437	.18	.17	.17
*Bunker Oil, 14-16 Be.	1.80	1.80	1.80
*Diesel Oil, 28-30 Be.	2.70	2.70	2.70
Furnace Oil, New York City	.10	.10	.10
Gas Oil, 32-36 Be.	.06¾	.06¾	.06¾
41-43 Kerosene prime white	.09	.09	.09

*Lighterage, 6.5c a barrel extra.

NEW YORK EXPORT PRICES

Motor Gasoline:	Feb. 24	Feb. 17	Feb. 10
58-60 Be. gravity, in cases	.30.15	.30.15	.29.15
U. S. Navy, in bulk	.16	.16	.15
Naphtha:			
60° F., 59-61 Be. gravity, in bulk	.18¾	.18¾	.17¾
60° F., 63-66 Be. gravity, in bulk	.20	.20	.19
60° F., 66-68 Be. gravity, in bulk	.21½	.21½	.20½
Kerosene:			
Standard white, 40-42 Be. grav., in bulk	.06½	.06½	.06½
Standard white, 40-42 Be. grav., in barrels	.13½	.13½	.13½
Standard white, 40-42 Be. grav., in cases	16.9	16.9	16.9
Water white, 42-44 Be. grav., in bulk	.07½	.07½	.07½
Water white, 42-44 Be. grav., in barrels	.14½	.14½	.14½
Water white, 42-44 Be. grav., in cases	17.9	17.9	17.9
†Lubricating Oils:			
Cylinder Stock, extra light filtered, 600, in barrels	.46½	.46½	.46½
Cylinder Stock, light filtered, 600, barrels	.40½	.40½	.40½
No. 1 white neutral, .878 spec. grav.	.43	.43	.43
No. 1 Summer Black, .895 spec. grav.	.19	18	.18
No. 5 Bright Stock, .897 spec. grav.	.50½	.50½	.50½
Special "A" red oil, .897 spec. grav., 170 vis.	.21	.21	.21
No. 2 red oil, .903 spec. grav., 212 vis.	.22	.22	.22
No. 1 red oil, .905 spec. grav., 265 vis.	.23	.23	.23
Polar red oil, .906 spec. grav., 295 vis.	.25	.25	.25
Pale oil, "25", .899 spec. grav.	.20½	.20½	.20½
Pale oil, "28", .892 spec. grav.	.16	.16	.16
Paraffin Wax:			
120-122 a.m.p., per lb.	.06¼	.06¼	.06¼
125-127 a.m.p., per lb.	.06⅜	.06⅜	.06⅜
130-132 a.m.p., per lb.	.06⅝	.06⅝	.06⅝
135-137 a.m.p., per lb.	.07½	.07½	.07½

†All lube prices in barrels.

LOS ANGELES EXPORT PRICES

	Feb. 24		Feb. 17		Feb. 10	
Kerosene water white	.05	.05½	.05	.05½	.05	.05½
U. S. Motor gasoline, 54-56, 437 end point	.10½	.11	.10½	.11	.10½	.11

CRUDE OIL PRICES

(Crude Price Changes on Page 206)

Arkansas and North Louisiana

Caddo, 38° and above	$2.05
35° to 37.9°	1.95
32° to 34.9°	1.85
Below 32°	1.70
Homer, 35° and above	1.80
32° to 34.9°	1.70
31° to 32.9°	1.60
Below 31°	1.45
Haynesville, 33° and above	1.70
Below 33°	1.60
El Dorado, 33° and above	1.70
Below 33°	1.60
Bull Bayou, 38° and above	1.85
35° to 37.9°	1.70
32° to 34.9°	1.55
Cotton Valley	1.40
De Soto	1.90
Crichton	1.70
Bellevue	2.00
*Stephens, Ark:	
Below 26°	1.40
26° and above	1.60
Smackover:	
Below 25°	1.30
25° to 25°9°	1.40
26° to 26.9°	1.50
27° to 27.9°	1.55
28° and above	1.60

*Posted by Atlantic Oil Producing Co.

Wyoming and Montana

Rock Creek (Wyo.)	1.70
Salt Creek	1.60
Big Muddy	1.60
Mule Creek	1.25
Grass Creek (light)	2.00
Elk Basin	2.00
Lance Creek	1.95
Osage	1.95
Cat Creek (Mont.)	2.00
Sunburst (Mont.)	1.20
Lost Soldier	1.28
Greybull and Torchlight	2.00
Hamilton Dome	1.60
Hogback, N. Mex.	2.05

Lost Soldier and Lander based on contracts covering entire production of fields.

Oklahoma, Kansas, North and Central Texas

Prairie Oil & Gas Co. and other major purchasing companies, except as noted:

Below 30°	1.35
30° to 32.9°	1.55
33° to 35.9°	1.80
36° to 38.9°	2.00
39° to 41.9°	2.25
42° and above	2.35

Sinclair Crude Oil Purchasing Co.—

39° to 41.5°	2.25
41.6° and above	2.35

Magnolia Petroleum Co.:

Below 28°	1.00
28° to 30.9°	1.35
*31° to 32.9°	1.55
Corsicana light	2.00
Corsicana heavy	1.00
Mexia and Wortham	2.00

*33° gravity and above, same as Prairie.

Humble Oil & Refining Co.

Powell, Currie, Richland	2.00
Mexia and Wortham	2.00

Moran crude:

Below 30° gravity	1.35
30° to 32.9°	1.55
33° to 35.9°	1.80
36° and above	2.00

Ranger and North Texas, same as Prairie.

Gulf Coast

Grade "A"	2.00
Grade "B"	1.75
Luling (based on contracts) 90c and	1.15
Laredo (Magnolia Petroleum Co.)	.85
Rockdale-Minerva (Milam County)	1.25
Calliham (Live Oak-McMullen)	1.15
Webb, Jim Hogg, Texpata	1.00
*High Island	.85

*Posted by Sun Co.

***Somerset**

Below 30°	1.25
30° to 32.9°	1.35
33° to 35.9°	1.80
36° to 38.9°	1.95
39° to 41.9°	2.10
42° and above	2.35

Posted by Grayburg Oil Co.

California

14° to 19.9°	$1.25
20° to 20.9°	1.27
21° to 21.9°	1.30
22° to 22.9°	1.33
23° to 23.9°	1.36
24° to 24.9°	1.40
25° to 25.9°	1.44
26° to 26.9°	1.48
27° to 27.9°	1.52
28° to 28.9°	1.56
29° to 29.9°	1.60
30° to 30.9°	1.64
31° to 31.9°	1.68
32° to 32.9°	1.72
33° to 33.9°	1.76
34° to 34.9°	1.80
35° and above	1.85

Rosecrans-Athens Field, only:

Below 35.9° gravity, same as other fields.	
36° to 36.9°	1.92
37° to 37.9°	2.00
38° to 38.9°	2.08
39° to 39.9°	2.16
40° to 40.9°	2.24
41° to 41.9°	2.32
42° and above	2.40

Eastern States

Penna Grade Oil in New York Transit Lines	3.85
Bradford District Oil in National Transit Lines	3.85
Penna Grade Oil in National Transit Lines	3.75
Penna Grade Oil in Southwest Pa. Pipe Lines	3.75
Penna Grade Oil in Eureka Pipe Line Lines	3.75
Penna Grade Oil in Buckeye Pipe Line Lines	3.75
Cabell Grade Oil in Eureka Pipe Line Lines	2.20
Corning Grade Oil in Buckeye Pipe Line Lines	2.25
Somerset Medium Oil in Cumberland Pipe Line Lines	2.30
Somerset Light Oil in Cumberland pipe Line Lines	2.45
Ragland Grade Oil in Cumberland Pipe Line Lines	1.30
Lima	2.33
Wooster	2.25
Illinois	2.12
Indiana	2.13
Princeton	2.12
Plymouth	1.65
Waterloo	1.20
†Oil Springs, Canada	3.05
†Petrolia, Canada	2.98
*Western Kentucky, 36° and above	2.05
*Western Kentucky, 33° to 35.9°	1.95
*Western Kentucky 32.9° and below	1.85
Cumberland, Warren and Monroe Counties (Kentucky), (Paragon Development Co.)	2.95

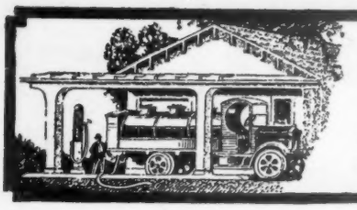
†Plus Government bounty of 26½c.

*Prices for Warren, Allen, Hancock, and Ohio Counties by Indian Refining Co. Prices for Warren and Simpson Counties by Paragon Development Co., same as Indian Refining Co.

Mexican Crude

*Tuxpam (f.o.b. Mexican ports)	$1.35
†Panuco (f.o.b. Mexican ports)	1.25
Tuxpam (New York)	1.99
Panuco (New York)	1.76

*Plus 33.00c tax. †Plus 20.00c tax.



TANK WAGON MARKETS

Tank wagon quotations for gasoline and kerosene in United States as furnished by the larger marketing concerns, Feb. 24.

ALL TANK WAGON AND SERVICE STATION QUOTATIONS INCLUDE TAXES

STANDARD OIL CO. (INDIANA)

Main Service Station Price

	Gasoline Tank wagon	Service station	Incids tax of	Kero. Tank wagon
Chicago Dist.—				
†100 gals. or more	18.0	21.0	...	12.0

Tank wagon prices on April 19, 1922; g. up 1½c; May 8, g. up 1c; June 27, both up 1c; July 19, g. down 2c. k. down 1c; Oct. 10, g. down 2c; Oct. 21, g. down 1c; Feb. 5, 1923, g. up 1c; Feb. 20, g. up 1c; Aug. 14, g. down 6.6c; Oct. 4, k. down 1½c; Nov. 10, g. down 1.4c; Dec. 29, g. up 2c; Jan. 12, 1924, g. up 2c, k. up 1c; Feb. 5, g. up 2c, k. 1c; July 18, g. down 1c; July 30, g. and k. down 1c; Sept. 12, g. down 2c; Jan. 23, 1925, g. up 1c; Jan. 26, g. up 1c; Jan. 31, g. up 1c; Feb. 12, g. up 2c, k. up 1c.

Decatur, Ill.	18.2	20.2	...	12.5
East St. Louis	17.1	19.35	...	11.6
Joliet	18.4	20.4	...	12.7
Peoria	18.2	20.2	...	12.5
Quincy	18.2	20.2	...	12.3
Davenport, Ia.	18.5	20.5	...	12.9
Des Moines	18.5	20.5	...	12.9
Keokuk	18.5	20.5	...	12.9
Sioux City	18.1	20.1	...	12.5
Duluth, Minn.	19.5	21.5	...	13.6
Minneapolis	19.2	21.2	...	13.6
La Crosse, Wis.	19.2	21.2	...	13.4
Milwaukee	18.1	20.1	...	12.3
Madison	18.3	20.3	...	12.5
Detroit, Mich.	20.8	22.8	2.0	13.2
Grand Rapids	20.7	22.7	2.0	13.1
Saginaw	20.9	22.9	2.0	13.3
Evansville, Ind.	20.0	22.0	2.0	12.5
Fort Wayne	20.4	22.4	2.0	12.9
Indianapolis	20.2	22.2	2.0	12.7
South Bend	20.4	22.4	2.0	12.9
Fargo, N. D.	20.9	22.9	1.0	15.6
Huron, S. D.	22.0	24.0	2.0	14.1
Sioux Falls	21.5	23.5	2.0	13.6
*Kansas City, Mo.	20.9	22.9	3.0	11.3
*Springfield	20.8	22.8	3.0	12.2
*St. Louis	19.6	21.9	2.5	12.0
*St. Joseph	20.0	22.0	2.5	11.9
Wichita, Kans.	17.8	19.8	...	10.8
Bartlesville, Okla.	19.4	21.4	...	10.9

*State tax is 2c. Remainder is city tax.
†Tank wagon price on less than 100 gallons, 19.0.

ATLANTIC COAST DISTRICT

Standard Oil Co. (New Jersey)

	Gasoline Tank wagon	Service station	Incids tax of	Kero. Tank wagon
Newark, N. J.	19.0	21.0	...	13.0
Atlantic City	19.0	....	...	13.0
Annapolis, Md.	22.0	24.0	2.0	13.0
Baltimore	21.0	23.0	2.0	11.0
Cumberland	22.0	24.0	2.0	12.5
Washington, D. C.	21.0	23.0	2.0	12.5
Norfolk, Va.	23.0	25.0	3.0	13.5
Petersburg	23.0	....	3.0	13.5
Danville	23.0	....	3.0	13.0
Richmond	22.0	24.0	3.0	13.5
Roanoke	23.0	25.0	3.0	13.5
Keyser, W. Va.	21.0	....	2.0	13.5
Charleston	20.0	22.0	2.0	13.5
Parkersburg	20.0	22.0	2.0	13.5
Wheeling	20.0	22.0	2.0	13.5
Charlotte, N. C.	23.0	25.0	3.0	13.5
Hickory	23.0	....	3.0	13.5
Mt. Airy	23.0	....	3.0	13.5
Salisbury	23.0	....	3.0	13.5
Charleston, S. C.	23.0	25.0	3.0	14.0
Columbia	23.0	25.0	3.0	14.0

PENNSYLVANIA-DELAWARE AND PART NEW ENGLAND

Atlantic Refining Co.

	Gasoline Tank wagon	Service station	Incids tax of	Kero. Tank wagon
*Pittsburgh, Pa.	19.0	24.0	...	14.0
*Philadelphia	19.0	24.0	...	14.0
*Scranton	19.0	24.0	...	14.0
*Allentown	19.0	24.0	...	14.0
*Altoona	19.0	24.0	...	14.0
*Erie	19.0	24.0	...	14.0
Dover, Del.	21.0	24.0	2.0	14.0
Wilmington	21.0	24.0	2.0	14.0
Springf'd, Mass.	21.0	25.0	...	13.0
Worcester, Mass.	21.0	25.0	...	13.0
Boston	21.0	25.0	...	11.0
Providence, R. I.	21.0	25.0	...	13.0
Hartford, Conn.	22.0	26.0	1.0	12.0
New Haven, Con.	22.0	26.0	1.0	13.0

*Pennsylvania tax of 2 cents is collected by the dealer and paid by him direct to the State.

CENTRAL SOUTH DISTRICT

Standard Oil Co. (Louisiana)

	Gasoline Tank wagon	Service station	Incids tax of	Kero. Tank wagon
New Orleans, La.	20.5	22.5	2.0	11.0
Alexandria	20.5	22.5	2.0	13.0
Baton Rouge	19.0	21.0	2.0	11.5
Lake Charles	20.5	22.5	2.0	13.0
Shreveport	20.5	22.5	2.0	13.0
Memphis, Tenn.	20.0	22.0	2.0	14.0
Chattanooga	21.5	23.5	2.0	14.5
Knoxville	22.5	24.5	2.0	15.0
Nashville	21.5	23.5	2.0	13.5
Bristol	23.0	25.0	2.0	13.5
Little Rock, Ark.	23.0	25.0	4.0	11.0

SOUTHERN DISTRICT

Standard Oil Co. (Kentucky)

	Gasoline Tank wagon	Service station	Incids tax of	Kero. Tank wagon
Atlanta, Ga.	24.0	27.0	3.0	13.0
Augusta	24.0	27.0	3.0	13.5
Macon	24.0	27.0	3.0	14.5
Savannah	22.0	25.0	3.0	13.0
Birmingham, Ala.	22.0	25.0	2.0	14.5
Mobile	21.0	24.0	2.0	12.5
*Montgomery	23.0	26.0	3.0	15.5
Clarksdale, Miss.	22.0	25.0	3.0	12.0
Jackson	22.0	25.0	3.0	10.0
Natchez	21.5	24.5	3.0	11.5
Vicksburg	21.5	24.5	3.0	11.5
Jacksonville, Fla.	22.0	25.0	3.0	13.0
Miami	24.0	27.0	3.0	14.5
Pensacola	22.0	25.0	3.0	13.5
Tampa	22.0	25.0	3.0	13.0
Lexington, Ky.	22.0	25.0	3.0	14.0
Covington	20.0	23.0	3.0	14.0
Louisville	22.0	24.0	3.0	12.0

*In addition to the State tax of 2 cents on gasoline, Montgomery has city tax of 1 cent on gasoline and ½ cent on kerosene.

SOUTHWESTERN DISTRICT

Magnolia Petroleum Co.

	Gasoline Tank wagon	Service station	Incids tax of	Kero. Tank wagon
Dallas, Texas	17.0	21.0	1.0	11.0
Fort Worth	17.0	21.0	1.0	11.0
Houston	17.0	21.0	1.0	11.0
San Antonio	17.0	20.0	1.0	11.0
El Paso	19.0	22.0	1.0	12.0
Muskogee, Okla.	19.0	22.0	2.5	12.0
Oklahoma City	19.0	22.0	2.5	12.0
Tulsa	19.0	22.0	2.5	11.0
Ft. Smith, Ark.	21.5	24.5	4.0	12.0
Little Rock	23.0	26.0	4.0	11.0
*Texarkana	18.0	21.0	1.0	11.0

*Does not include 1c additional tax.

ROCKY MOUNTAIN DISTRICT

Continental Oil Co.

	Gasoline Tank wagon	Service station	Incids tax of	Kero. Tank wagon
Casper, Wyo.	20.0	22.0	1.0	13.0
Cheyenne	21.5	23.5	1.0	14.5
Albuquerque, N. M.	24.5	27.5	1.0	16.5
Salt Lake, Utah	23.0	25.0	2.0	18.0
Denver, Colo.	21.0	23.0	2.0	14.5
Pueblo	21.0	23.0	2.0	14.5
Butte, Mont.	22.0	24.0	2.0	16.0
Helena	24.0	26.0	2.0	17.0
Boise, Idaho	23.5	25.5	2.0	20.0

NEW YORK AND PART OF NEW ENGLAND DISTRICT

Standard Oil Co. (New York)

	Gasoline Tank wagon	Service station	Incids tax of	Kero. Tank wagon
Albany, N. Y.	21.0	....	...	13.0
*New York	21.0	....	...	13.0
Buffalo	21.0	....	...	12.0
Rochester	21.0	....	...	13.0
Syracuse	21.0	....	...	12.0
Boston, Mass.	21.0	....	...	13.0
Providence, R. I.	21.0	....	...	13.0
Augusta, Me.	22.0	....	1.0	13.0
Manchester, N. H.	23.0	....	2.0	13.0
Burlington, Vt.	22.0	....	1.0	13.0

*Price in steel barrels.
Note: Standard Oil Co. of New York does not generally quote service station price in its territory. In most cases the service station price is 2 or 3 cents higher than tank wagon price.

PACIFIC COAST DISTRICT

Standard Oil Co. of California

	Gasoline Tank wagon	Service station	Incids tax of	Kero. Tank wagon
San Francisco	17.0	20.0	2.0	15.5
Los Angeles	15.5	18.5	2.0	15.5
Fresno	17.5	20.5	2.0	19.5
Reno, Nev.	20.5	23.5	2.0	19.0
Portland, Ore.	18.0	21.0	3.0	16.5
Seattle, Wash.	17.0	20.0	2.0	16.5
Tacoma	17.0	20.0	2.0	16.5
Spokane	21.0	24.0	2.0	20.5
Phoenix, Ariz.	23.0	26.0	3.0	21.5

OHIO

Standard Oil Co. (Ohio)

	Gasoline Tank wagon	Service station	Incids tax of	Kero. Tank wagon
All Ohio points	18.5	20.5	...	15.0

NEBRASKA

Standard Oil Co. (Nebraska)

	Gasoline Tank wagon	Service station	Incids tax of	Kero. Tank wagon
Omaha	16.0	18.0	...	12.5
Crawford	19.0	....	...	13.25
McCook	19.75	21.75	...	14.0
Norfolk	18.75	20.75	...	13.0
North Platte	19.75	21.75	...	13.75
Scotts Bluff	19.25	21.25	...	13.25

TANK WAGON CHANGES

February 18.—The Continental Oil Co. advanced tank wagon and service station prices 2 cents at Albuquerque, N. Mex. The Standard Oil Co. of Nebraska advanced gasoline tank wagon and service station prices 2 cents and kerosene 1 cent in Nebraska.

February 19.—The Standard Oil Co. of Ohio advanced gasoline tank wagon and service station prices 1½ cents throughout Ohio.

February 20.—Standard Oil Co. of Kentucky advanced gasoline tank wagon and service station prices 1 cent at Covington, Ky.

February 21.—The Continental Oil Co. advanced kerosene tank wagon prices 1 cent throughout its territory.

February 24.—Standard Oil Co. Kentucky raised tank wagon and service station prices of gasoline throughout its territory 1 cent.

CRUDE PRICE CHANGES

February 16.—Ohio Oil Co. advanced Waterloo crude 20 cents, making it $1.20 a barrel.

February 18—Ohio Oil Co. advanced Big Muddy and Rock Creek, Wyoming, crudes 5 cents each, making the prices for those fields $1.60 and $1.70 respectively. The Midwest Refining Co. also posted 5 cent advances in Salt Creek, Rock Creek and Big Muddy Crudes.

OKLAHOMA REFINED OIL PRICES SLIGHTLY LOWER

(Continued from Page 22)

ly bulletin the past week points to the increase in Mid-Continent operations and questions whether or not the expansion programs of many refiners are justified. The bulletin says in part:

"So far this year, conditions of business have been encouraging, but with no indication of a boom. There has been a fair trade in most lines, but slightly in excess of last year. Buyers are still in a conservative mood, and while confident for the future, are inclined to limit purchases to the requirements of the present or for a period not far ahead. Speculative sentiment is less prevalent and grain prices have declined. All things considered, we need feel no apprehension regarding 1925, but should remember that despite a spirit of optimism, the history of the year is as yet unwritten, and there is no concrete evidence that it will prove more than a normal year."

"We can recall no period during recent years when the refining industry faced brighter prospects for the future. We can also recall no time when statistics indicated a greater need for caution, nor when there was greater opportunity for misapprehension of conditions. The success of the refining industry, during the year 1925 will probably be dependent entirely upon the wisdom of operations. Reasonable production, inventories and expectations will undoubtedly lead to profits, while ignorance of conditions, or a failure to conform operations to conditions will just as surely be written in the red.

Other Products

The March outlook for other products does not point to higher prices. Fuel oils and distillates are not expected to recover from their sluggishness and changes in prices will probably be down rather than up. This has already been indicated in sales made for March delivery. One sale of 20-22 gravity fuel oil was reported for March at $1.25 and other refiners are willing to sell at that price. A substantial increase in demand will be needed during March to maintain present kerosene prices. Natural gasoline and blends will probably follow closely changes in the status of straight run gasolines.

Gasolines and Naphtha

Export buying in which the Oklahoma trade was interested was confined to two purchases of 64-66, 375 by the Sinclair Refining Co. and the Atlantic Refining Co. The first company is said to have purchased 1,000,000 gallons placing practically all the business with north Texas refiners. The Atlantic's purchase is said to have been for 500,000 gallons all of which was placed with Oklahoma refiners. The reported price was 16 cents.

These purchases were the first that had been made by exporters in 10 days. They led to the conclusion that the exporters will continue to absorb part of the higher gravity output of refiners during March. There were other inquiries from exporters during the week but so far as known the orders was confined to the purchases just mentioned. Sales of the domestic grade of 64-66, 375 were made both above and under the 16-cent export price. One sale at 15½ cents was reported for immediate shipment. Prices on 60-62, 400 and the 68-70 grades were ¼-cent lower than last week. Naphthas were also available at prices lower than last week. The price situation in regard to 58-60, 437 the principal domestic grade was previously explained.

Kerosenes and Distillates

The price range on the several grades of kerosene vary from 4 to 6 cents. Several refiners are still refusing to lower the price levels established 10 days ago when they advanced, following the latest advance in crude prices. Other refiners, however, when they found that they could not sell at the higher prices reduced their prices. It was expected that some export purchases would be placed last week. It has not made its appearance up to this time. The 41-43, water white grade sold for domestic shipment as low as 4¾ cents with 5 cents the minimum price on 42-44, water white. Several refiners were getting as high as 5½ to 6 cents for the two grades direct from the trade.

The 38-40 straw distillate was offered freely at 3⅞ and 4 cents. No large orders were placed during the week.

Fuel and Gas Oils

The price range on the better grades of fuel oils was from $1.27½ to $1.35 for under 26° gravity. Sales of other grades were as low as $1.22½ cents. The slumping market is due to market conditions outside Oklahoma for refiners in that State have little fuel oil in storage. Probably half of the refiners in the State will have no fuel oil to offer in the spot market during March as their present committments including the railroad contracts will absorb their entire output. Prices have sagged in other areas where larger quantities are available and this has forced the Oklahoma refiner to lower his prices.

Gas oil is still fairly firm. Occasional sales at 3⅝ are reported for 32-36, but the general market continues at 3¾ to 3⅞.

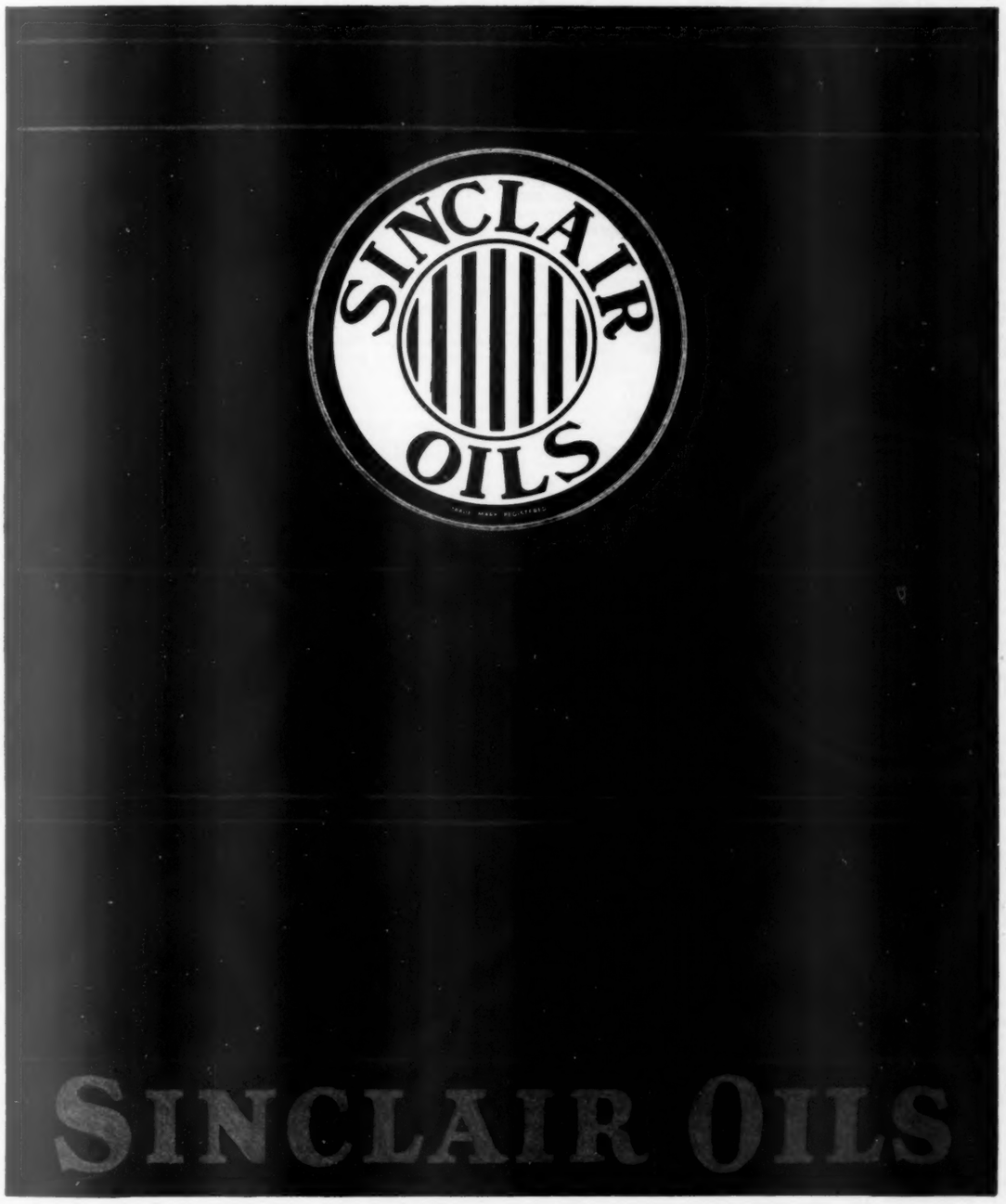
Natural Gasolines and Blends

There was little change in natural gasoline prices. Very little material of strictly Grade A specifications is being offered. Sales of this grade were made at 13¼ cents. The Double A grade sold as low as 13 cents. The B grades were more freely offered. Grade C prices are unchanged.

Blenders are having as much difficulty as the refiners in securing orders direct from the jobbers. Sales during the week were confined to the regular week to week purchases.

Lubricants and Wax

The general advance in neutrals was 1 cent. Steam refined cylinder stocks are active and prices are firm. Wax inquiries during the past week indicated this product has become easier.



ONE of our responsibilities, represented by the Sinclair trademark, is to maintain a supply of crude oil which amply protects our sale of refined products. This is done through our affiliated companies, and gives our customers a feeling of security that their orders will be filled promptly.

SINCLAIR REFINING COMPANY

New York: Sinclair Oil Bldg., 45 Nassau St. Chicago: 111 West Washington St.

Cable Address: "Lucent"

Southwestern Oil Session at El Dorado

Arkansas Petroleum Club and Mid-Continent Oil & Gas Association Hear Addresses by Messrs. Pew, Buchanan and Malloy

By M. L. Vaughn

EL DORADO, Ark., Feb. 19.—A remarkable manifestation of goodwill and enthusiasm marked the gathering of oil and railroad men when the Mid-Continent Oil and Gas Association and the Arkansas Petroleum Club joined hands in a program of welcome and entertainment in El Dorado, Wednesday. More than 300 out of town guests responded and the Mid-Continent fields were well represented, with a scattering few from Memphis, New Orleans and the East. El Dorado's Chamber of Commerce, the Rotary Club and other local organizations cooperated in making a success of the occasion.

The meeting was called primarily to promote good fellowship and a better understanding between the oil industry, the railroads and the general public.

Following registration at the Chamber of Commerce offices, the guests were entertained at luncheon by the Rotary Club, H. H. Rachford, of the Gulf Refining Co., presiding. Among those called upon to speak were J. E. Gorman, president, of the Rock Island & Pacific Railway, J. Edgar Pew, president of the American Petroleum Institute, Mr. Buchanan, recently appointed general manager of the Missouri-Pacific Railway, Joe Elam, secretary of the Mid-Continent Oil & Gas Association of Louisiana and Arkansas, Mr. Moses and Clarence Holland, president and commercial secretary of the Chamber of Commerce of Little Rock.

All who wished were taken for a trip through the Smackover oil field.

Victor H. Smith, manager of the Lion Oil & Refining Co., and president of the Arkansas Petroleum Club, acted as toastmaster at the banquet in the evening. He read the following telegram from Secretary Hubert Work of the Department of the Interior:

Message From Secretary Work

"On behalf of the Federal Oil Conservation Board permit me to acknowledge receipt of your telegram of February 13, and to express appreciation to the Arkansas Petroleum Club and the Mid-Continent Oil and Gas Association for the kind invitation to address your joint meeting.

"In creating the Federal Oil Board to study the many problems confronting both the Government and the industry, the President stated that one of the principal functions of this board was to determine the Government's responsibilities and to enlist the full cooperation of representatives of the oil industry. As the industry's welfare is so intimately linked with the industrial prosperity and safety of the whole people, the President was of the opinion that the Government and business might very properly and to mutual advantage join forces to work out a problem of practical conservation. The board invites the frank opinions and suggestions of those who have by constructive action contributed to the success of the industry. Working in harmonious cooperation the Government and the oil industry can undoubtedly determine upon a practical and economically sound policy that will be beneficial to both alike." The first address was by Pat Malloy, president of the Constant Refining Co., of Tulsa, on "The Southwest and the Petroleum Industry."

Mr. Malloy said:

"In the short space of little more than 20 years—for the most part within a single decade—this territory has brought above ground nearly 3,000,000,000 bbls. of crude oil, made ready and conditioned every barrel, delivered it and received as reward for the effort, full five billions of American dollars! A sum that equals half the total worth of all the oil that has ever been found within the limits of these United States since the discovery of petroleum in Pennsylvania nearly 70 years ago!

"Here then is some answer at least to the question of what the oil business has done in the Southwest. The difference between 4,000,000 bbls. in 1901 and 400,000,000 bbls. in 1924 states in a sentence a phase at least of the progress that has been made.

"The full effect of this effort becomes clearer as it is backgrounded against what the rest of the world has been able to do in producing crude oil. The total production of all countries for 1924 was, roughly, 1,000,000,000 bbls. South America produced 1.6 per cent, Europe about 5½ per cent, Asia a little less, Mexico something over 14 per cent, and the United States 72 per cent. Of this amount the Southwest contributed 410,000,000 bbls., or 57 per cent of the total production of the United States—over 40 per cent of all the production of all countries. The picture becomes clearer if only a little local color be added to it. Not a barrel of oil had ever been realized in the entire State of Arkansas prior to 1921. The production of this, the youngest State in the petroleum group, for 1924 was 48,000,000 bbls. Arkansas produced one-third as much oil, for the same period as did the old oil country of Mexico, as much crude oil as Russia, five times more than Persia, more than three times as much as the Dutch East Indies, nearly four times as much as Rumania, six times as much as India, and more than twice as much as was realized from every field in all of South America for the same period.

"At the end of 1924 the genius and adventure of the men of the Southwest country, at uncounted cost and unstated hazard, had brought to the markets of the world 50 per cent more crude oil than Russia had ever produced, three times as much as Mexico, five times as much as Asia. More barrels of this valuable, precious product than all Europe had ever brought to the surface of the earth. Although its real development did not set in until something less than 15 years ago, it has nevertheless in that space of time produced and made ready for market one-quarter of all the crude oil developed and recovered from the sands that lie beneath the soil of the earth!

National Petroleum Policy

"A national petroleum policy is already in the making and to be made. Official Washington is already at work. Opinion out of doors, under pressure of every genius and adverse interest, is being formed. This time there is at least an appearance of fairness, however much it may be to make up its mind upon a subject with which it is so unfamiliar. The present Federal service and surveys are efficient and can be enlarged. The Government has but one field where with profit it can labor, but one phase in the industry that calls for its analysis, its investigation and its action—the field of international policy. The international agreements, as they bear on and affect petroleum, embrace not only the promotion of our commerce, but the safety of the Republic. The real protection of American investments in foreign oil fields and the control of alien development of American oil resources on a reciprocity basis, present a duty and an opportunity at once for all the statecraft, wisdom and courage that Washington can command.

"The industry never had fairer chance to make good its cause—the cause of private enterprise. A sobered and reasoned public opinion asks only that we make our demand for fair profits and square play. The period of public hysteria has passed; the day of the national exploiter, who lives upon the hate and prejudice and passions of mankind, is done. If I understand the temper of our people today, it is that upon every hand there is an honest intention to do the right and the fair and the square thing by business. The heart of every man is turning again to the old and best traditions of America, with a dependence born of necessity upon old and familiar and tested principles.

Oil Men Must Act

"If the oil men of America are to have vindication, it must be by and through themselves. Security shall come, if it comes at all, in the decision of the Cabinet or Congress or Committee to take no action, to keep hands off, and to entrust to the business men who built the petroleum industry the sole duty and obligation to preserve it and at the same time maintain the supremacy of the country itself. There cannot be any thought of a program that admits in the least circumstances of Government interference, regulation or control of the reserves or resources of America. Any inquiry or investigation of our business by any Government agency is a step in a dangerous direction. To invoke Government investigation is to admit the necessity for it. It is an old maxim familiar to lawyers that to invite jurisdiction for one purpose, one must run the risk of accepting it for all purposes. The power of the Legislature to investigate, of necessity presupposes the power to remedy by the enactment of law. Eternal vigilance is to the American business man of today precisely what it was to the fathers of this county—the price of liberty.

"Petroleum is so essential to our commercial supremacy, to the maintenance of our very institutions, that there must not be any mistake in the policy of our Government toward it. To its interest, towards its enlargement, to the single end that it may be fostered, protected and preserved, the whole full policy of the Nation and of its every State must be written. The enterprise is so big, so vital to national interest, so near to the very fortunes and well being of every citizen, it must not suffer in a single circumstance from the organized effort of a wilful or ambitious few. It is the imperative dictate of wise counsel that to private enterprise and investment and control must its future be committed and confirmed. Law and its administration if it shall serve itself and the public wel-

POPULAR PREJUDICES AGAINST OIL ANALYZED BY PRESIDENT J. EDGAR PEW

By J. Edgar Pew
*President American Petroleum Institute**

I will now call your attention to a few facts of the industry, probably not usually understood by the public, and then to a few prejudices of the public toward the industry, and my belief as to the reason for these.

From a beginning in 1859 the growth of the oil industry to its present proportions is an accomplishment we have much to be proud of, and a result in the added wealth to our country's resources that should commend the respect of the entire public. For some unknown reason, the oil industry has failed in getting this consideration, and has been burdened on this account to an unusual degree. I think this has several explations, some of which I will state briefly:

1. The supposed Standard Oil domination.

There may have been a time when the Standard Oil interests were more or less supreme in the oil industry. They made the price paid for crude oil; in many places they controlled the refined market; they, to a large extent, controlled the transportation. They never did control production, and it is and always has been production that was the foundation of the business. The only extent to which Standard Oil controlled this was in the prices paid for oil. But the best informed of the producers of oil will tell you that this control was usually exercised in a manner that was for the producers' interests. The Standard needed the oil for its refineries and paid the price that was necessary to produce this oil.

Since 1914, the relative position of the so-called Standard companies, with that of the independents, has been greatly reduced in transportation and refining, and today they represent less than 20 per cent of the production. Any relatively small purchaser of crude oil can advance the entire markets of the country by posting a higher price than the Standard companies are paying. The lead in market changes has been taken probably at least as frequently by these independent purchasers in the past six years as it has been by the Standard companies. This is not a brief for the Standard companies—they are well able to take care of themselves—but it is given in defense of the position of the independent, who is less able than these larger companies to stand under many of the hostile and unjust measures of the public, arising out of its attitude taken because of the prejudice against Standard Oil.

2. An unfavorable attitude by the public toward the oil industry comes from the public's misunderstanding of the profits. There have been few fabulous fortunes made out of oil;—these have been made from other enterprises as well; in oil, these are usually the result of exceptional good fortune, and are usually confined to the individual or company which develops an exceptionally profitable property, and whose activities are confined to the business in a limited way. But this is not the oil business, any more than is the best corner lot in a city the entire real estate business, or the best and richest tract of farming, the entire farming business.

If the farmers of this country had to live on the prices at which the few best farmers could afford to sell their products, most of them would starve, and if the 95 per cent of small oil well owners had to live on a price the owner of a gusher could afford to sell his oil for, he would soon be a financial wreck, and would have to discontinue producing oil. If it were not for the oil produced by this 95 per cent the public would have a very

(Continued on Page 210)

* Before Arkansas Petroleum Club and Mid-Continent Oil & Gas Association at El Dorado, Ark., February 18.

fare and promote the prestige of America, shall be drawn and executed in its relation to the petroleum business upon that wise and familiar principle of Jeffersonian democracy to which America has always been dedicated: That law governs best which governs least.

"I dare to serve notice upon ignorant propagandists everywhere that the American oil man stands ready not only to defend his investment, but to contend in every form for the establishment of an affirmative, active and cooperative national petroleum policy. In all the schemes for a wise public opinion that shall be made, there can be no place for the slightest influence of the designing or ambitious politician. Our tariffs, our taxes, the basis of railroad rate structures, international treaties and agreements themselves must be drawn, set up and declared for the aid of the American petroleum industry, that its investments may be made safe, its prosperity permanent, and its progress assured."

Charles S. McCain, president of the Bankers Trust Co., of Little Rock, Ark., spoke on "Finance and Banking."

D. E. Buchanan, of Tulsa, president of the Natural Gasoline Manufacturers' Association, spoke of "The Natural Gasoline Industry, from a Conservation Standpoint." (His address will be found on page 126.)

J. E. Gorman, of Chicago, president of the Chicago, Rock Island & Pacific Railway Co., closed his remarks by expressing the hope that if an interstate oil commission were appointed by the Government, that "all the members would be oil men."

The principal address of the evening was given by J. Edgar Pew, president of the American Petroleum Institute, and vice president of the Sun Oil Co., Dallas, Tex., "The American Petroleum Institute and the Oil Industry."

FAMOUS 101 RANCH HAS SKIMMING PLANT

(Continued from Page 24)

that they will create a scramble for leases and may completely revise estimates of the pool's importance if they should prove to be productive. A glance at the accompanying contour map shows that several of the outlying tests located from one-half mile to 1½ miles from the present productive area have considerably less than an even break for commercial production unless they happen to find other structures. Some reliable geologists who have studied the field carefully predict that no less than nine of these hazardous attempts will be fruitless so far as oil is concerned. All of these are seeking the 4,000-foot level, the elusive Wilcox sand, and each represents a cash outlay of from $50,000 to $65,000.

One peculiar feature of this field that is hard to explain is the Magnolia Petroleum Co.'s well in the southeast corner of the northwest quarter of Section 9. It made about 10 bbls. daily from the Wilcox horizon at 4,241-77 feet, which figures out nearly 50 feet lower than any other producer in the field, considering surface elevations, and about 150 feet lower than the present high well.

Probable Peak 25,000 Bbls.

Some estimators have placed Watchorn's probable peak at approximately 25,000 bbls. according to the indications revealed so far. Drilling operations, however, should provide data within the next two weeks on which an accurate estimate can be made. The field was averaging about 9,200 bbls. daily during the past week.

The Watchorn oil in the Wilcox sand is of customary high gravity, averaging around 43 to 45 degrees Baume, and therefore commands the top price at all times. The oil in the 2,700-foot sand, however, tests only about 37 degrees. An analysis of the oil from the deep sand in the Watchorn Oil & Gas Co.'s No. 3 G. L. Miller, in the southwest quarter of Section 33-23-3 showed 43 per cent of 58-60, 437 U. S. Motor gasoline, 5 per cent of kerosene, 15 per cent gas oil and 34 per cent of 22-26 fuel oil, with a loss of 3 per cent. This well was good for 325 bbls. from sand at 2,742-50 feet and 650 bbls. from the Wilcox at 4,117-18 feet.

Drilling in area covered by the accompanying map dates back as far as 1916 when the Cosden Oil & Gas Co. drilled the duster shown in Section 27-23-3 to 3,658 feet. The Fortuna Oil Co. completed a gasser good for 18,000,000 feet of gas in November of 1917. It was No. 2 D. Miller in the C NW NW of Section 4-22-3. In May of the next year, the Watchorn Oil & Gas Co. shut in its No. 2 D Miller along the north line of the same section for 7,000,000 feet of gas in sand at 2,028-50 feet. This well is now being deepened to the Wilcox sand.

Well Log Shows History

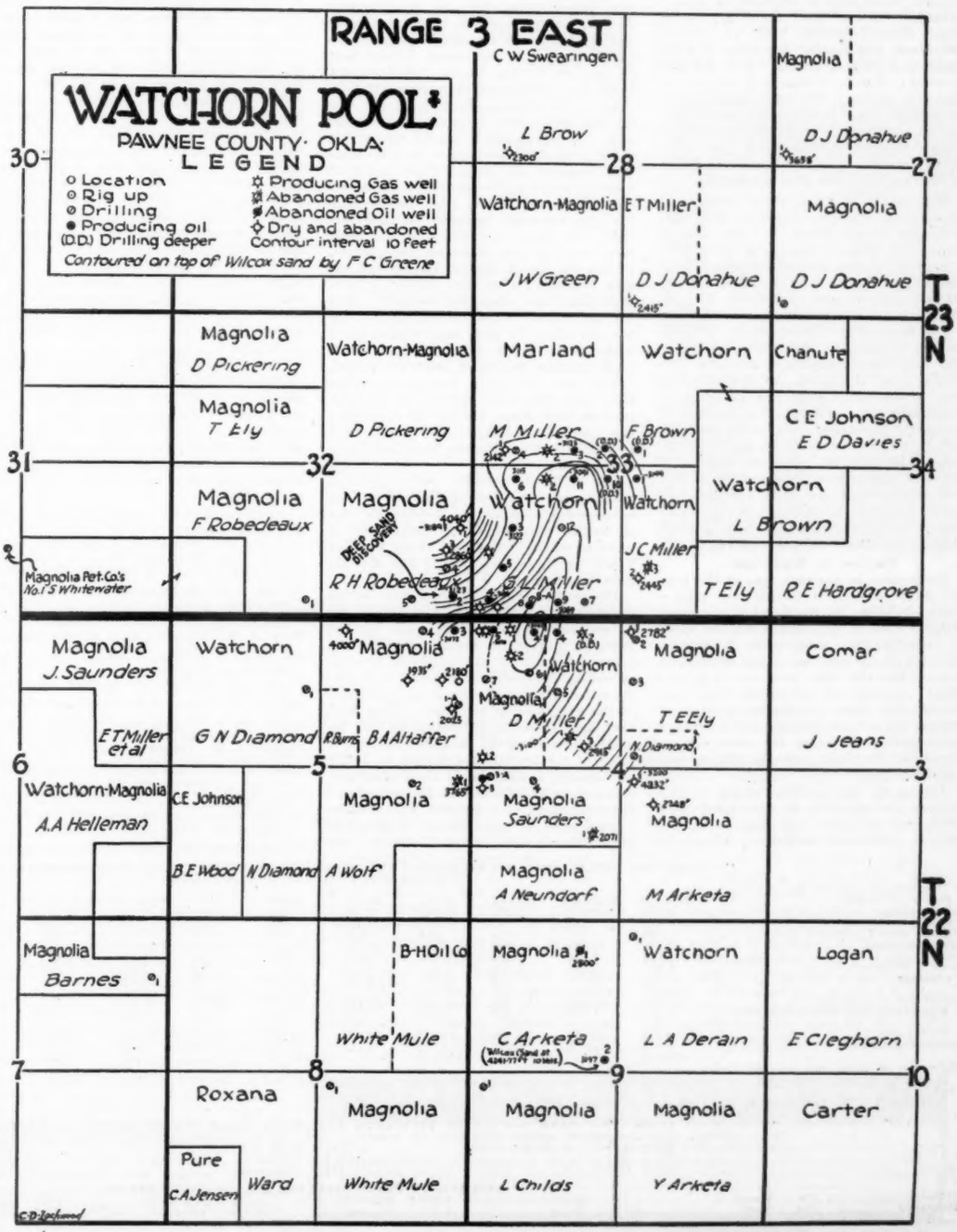
A well whose log is graphic history of the field is the Magnolia Petroleum Co.'s No. 3 B. A. Altaffer in the NE cor. of Section 5-22-3. It was completed in March of 1920 for 7,500,000 feet of gas at 2,005-10 feet and deepened to another gas sand at 2,688-92 feet in June of 1922. Late in August of the same year it was deepened 8 feet farther and increased to 13,000,000 feet of gas. In February of 1923 it was drilled into oil sand at 2,712-17 feet, where it produced 250 bbls. and in August of 1924 topped the Wilcox at 4,051-65 feet, making 960 bbls. It was again deepened 4 feet about the middle of November last year resulting in a jump from 500 to 2,002 bbls.

Several excellent producers have been drilled on the Miller leases in the Watchorn Pool. Late in August last year, the Watchorn Oil & Gas Co.'s No. 4 George L. Miller, SW cor. Section 33-23-3, topped the Mississippi lime at 3,795 feet and found the Wilcox pay at 4,102-10 feet, good for 1,176 bbls. in the first 24 hours. Gravity of the oil tested 43.5 degrees. In the middle of November it was making 580 bbls. daily and was then deepened 5 feet with a resultant increase to 1,900 bbls. A week later the hole was lowered 5 feet more and production jumped to 2,100 bbls.

In September, the same company's No. 9 Miller, in the same quarter section, an old 2,700-foot well, was completed in the Wilcox sand at 4,079-4,104 feet for 1,400 bbls. production. No. 5 on the same lease made 840 bbls. from sand at 4,122-30 feet in October last year. On February 20, No. 9 was still flowing 653 bbls. and No. 5 153 bbls. No. 3 on this quarter section, which was formerly a 325-bbl. producer in the 2,742-50-foot level, was deepened in November to 4,117 feet, where it made 650 bbls. No. 11 was drilled to the Wilcox last August and produced 500 bbls. from only 1 foot in the sand. When deepened early this month, it jumped to 1,050 bbls., sand record being 4,040-70 feet, and was doing 883 bbls. on the twentieth.

In Section 4-22-3, the same company drilled a 1,200-bbl. well on its Diamond Miller lease, northwest quarter. Sand was topped at 4,106 feet and pay found at 4,112-45 feet. This came in about February 8. One of the best wells in the field was the Magnolia Petroleum Co.'s No. 5 D. Miller, NW cor. Section 4-22-3, which flowed 180 bbls. the first hour after deepening to 4,100 feet in sand reached at 4,064 feet and produced 2,697 bbls. the first day. It was brought in last October and on February 20 was still good for 2,289 bbls. No. 4 on the same lease came in for 1,680 bbls. on the first of February from sand at 4,066-4,106 feet and was holding up to 1,071 bbls. on the twentieth.

(Continued on Page 211)



PRELIMINARY SUMMARY CRUDE STATISTICS, 1924

(Continued from Page 190)

with those in 1923 and established another high record. Nevertheless, consumption was insufficient to prevent an increase of pipe line and tank farm stocks, which during the year were increased by 18,000,000 bbls. The year 1924 is the sixth consecutive year in which stocks have been added to, although the increase was 64,000,000 bbls. less than that in 1923.

Crude Stocks Increased

Pipe line and tank farm stocks of crude petroleum on December 31, 1924, amounted to 352,896,000 bbls., in addition to which more than 43,000,000 bbls. of crude oil was held at refineries and there were possibly 10,000,000 bbls. on producing properties. The principal changes in pipe line and tank farm stocks during 1924 were increases of almost 9,000,000 bbls. of Rocky Mountain grades, more than 7,000,000 bbls. of California grades, and 6,500,000 bbls. of Mid-Continent grades. As contrasted with these increases, there was a decrease of almost 4,000,000 bbls. of Gulf Coast grades, of more than 1,000,000 bbls. of foreign petroleum, and smaller decreases of Kentucky and Illinois grades. The increase in stocks, therefore, consisted entirely of domestic grades. Not only was the full amount of imports delivered to consumers but stocks of imported oil were drawn upon. Deliveries of domestic petroleum to domestic consumers amounted to 37,000,000 bbls. less than production.

Shipments of California crude oil through the Panama Canal to Gulf and Atlantic Coast ports in the United States, in direct competition with Mid-Continent grades, amounted to approximately 40,000,000 bbls. in 1924, as contrasted with almost 53,000,000 bbls. in 1923.

The daily average new supply (production plus imports) amounting to 2,024,452 bbls. for the month of January, was 33,290 bbls. less than the demand (the sum of indicated deliveries to domestic consumers plus exports) but from February to September, inclusive, the new supply was considerably in excess of demand. During the last three months of the year these conditions were reversed, and in December the daily average indicated demand, amounting to the high record of 2,232,903 bbls., was 218,129 bbls. in excess of the new supply.

Decline in September

Production in January was at the lowest daily average rate for the year—1,821,129 bbls. By April it had increased 160,000 bbls. a day and remained close to 1,980,000 bbls. a day until September, the peak of the year occurring in August, when 1,990,450 bbls. was the daily average quantity of petroleum that was transported from producing properties. Decline began in September and continued throughout the rest of the year, and in December the daily average output was 1,826,355 bbls.

Among the noteworthy changes in production during 1924, as contrasted with 1923, may be mentioned considerable decreased output in California, Wyoming, and Louisiana, smaller losses in Illinois, Indiana, Kentucky, Ohio, Pennsylvania, Tennessee, and West Virginia, and increased output in Oklahoma, Arkansas, Texas, Colorado, Kansas, New York, and New Mexico.

In California decreased production of the three large pools in the Los Angles Basin, together with the smaller decrease of the older pools, in spite of the development of the Dominguez Pool, the increased output of Torrance and of some of the pools in the San Joaquin Valley and elsewhere in which wells had been shut down in 1923, resulted in a loss of almost 33,000,000 bbls. In Wyoming, decreased output of the Salt Creek Pool is recorded. The peak production for this pool, for which an increasing output has been recorded since 1912, was attained in January, 1924, when a daily average production for the month of more than 112,400 bbls. is recorded. Since January, the output of the Salt Creek Pool has steadily declined and in December the daily average was reduced to less than 50,000 bbls. Many wells in this pool have been idle since they ceased to flow, awaiting the construction of a large electric power plant for use in pumping. Recent discovery of oil in deeper sands will tend to check the decline of the Salt Creek Pool. In Louisiana development of the new Cotton Valley and Lockport Pools was insufficient to overcome the decline of the older pools, and the net loss for the State was more than 4,000,000 bbls. In Oklahoma increased output resulted from flush production in the Cromwell, Papoose, and Stroud Pools and from a deeper sand at Tonkawa. In Arkansas the Smackover Pool is chiefly responsible for the recorded increase of 8,000,000 bbls. In Texas the pools in the fault zone east of the Balcones escarpment, Powell, Richland, Mexia, Luling and the new Wortham Pool, are chiefly responsible for the sustained output. The Wortham Pool discovered late in November and which 51 days later was credited with a daily output of 167,000 bbls., is the most quickly developed pool on record. Other new oil pools developed during 1924 are Rainbow Bend in Kansas, Moffatt and Fort Collins in Colorado, Big Lake in Montana, Rattlesnake and Hogback in New Mexico, and Rex Lake in Wyoming.

One of the noteworthy developments of of the year was the application of the seismograph and of the torsion balance to finding salt domes, the discovery of three of which in the Gulf Coast Field of Texas by these instruments has already been reported.

Prices for crude petroleum rose during the first part of 1924 and remained for several months at the high point for the year, but during the summer and fall the prices of most of the principal grades, excepting California, were reduced and at the end of December were at or near those of the beginning of the year. Thus Mid-Continent grade, of gravity 33 to 35.9 degress, rose from $1 a barrel (the low price of the period of deflation in 1921) on January 1, 1924, to $1.75 on March 8, dropped to $1.50 on July 28, and closed the year at $1.10 a barrel. The average annual price at the wells of crude oil of all grades in the United States for the past few years, the average price of typical Mid-Continent grade crude, and the supply and demand of crude petroleum for the period 1920-1924, by months, is shown in the accompanying diagram. The year 1925 opens with a general feeling of optimism in the industry. The indication is that the Wortham Pool has reached its peak; and, with no other new major pool in sight, a continued decrease in the large supply of stocks is anticipated. Prices of Mid-Continent grades of crude oil were increased twice during January, the price of oil of gravity 33 to 35.9 degrees being raised from $1.10 to $1.55 a barrel.

TRANSPORTATION LOSS DATA SOUGHT BY BOARD

(Continued from Page 25)

pipe line leakage, leakage of measuring tanks or storage tanks, evaporation losses at measuring stations or at tank farms. What is your estimate of the total loss between the gauge tank and the refinery and what practical methods should be adopted for reducing such losses?

"(2) There has been a certain loss of oil both on the lease and on tank farms due to the presence of emulsions that must be treated in some way in order to separate the oil. What is the most practical scheme for recovering this oil?

"(3) On January 1, 1925, the pipe line and tank farm stocks of crude petroleum in this country amounted to approximately 350,000,000 bbls. Some of this oil had been in storage only a few days, while part of it has been stored for periods of several months or longer. What is your estimate of the average monthly loss from this storage and what means can be adopted for reducing the losses?

"(4) A considerable amount of crude oil is transported to the refineries by tank car. What is your opinion as to the losses occurring in connection with the transportation by tank car as compared with pipe line losses?

"Any information that you can furnish on other problems relating to the transportation of oil will be appreciated by the Federal Oil Conservation Board. The best technical opinion is sought, together with specific suggestions as to ways and means, from those qualified to advise this Board, and therefore we urge your full cooperation."

Among those to whom the letter was addressed were:

Bascom, R. P., Ozark Pipe Line Corp., Arcade Bldg., St. Louis, Mo.
Brown, C. C., Marland Pipe Line Co., Ponca City, Okla.
Brown, E. R., Magnolia Petroleum Co., Dallas, Tex.
Brown, Floyd C., Empire Companies, Bartlesville, Okla.
Bush, R. D., California State Mining Bureau, Ferry Bldg., San Francisco, Cal.
Bushnell, D. S., Buckeye Pipe Line Co., 18 Broadway, New York City.
Finney, W. R., Midwest Refining Co., Casper, Wyo.
Gage, W. P., Pure Oil Pipe Line Co., Dallas, Tex.
Gates, W. F., Prairie Pipe Line Co., Independence, Kans.
Golden, J. E., Tidewater Pipe Line Co., 11 Broadway, New York City.
Graham, Col. J. H., president Indian Refining Co., Lawrenceville, Ill.
Hall, H. H., Standard Oil Co. of California, San Francisco, Cal.
Haskell, Frank R., Empire Pipe Line Co., Bartlesville, Okla.
Hill, J. H., Texas Pipe Line Co. of Oklahoma, Tulsa, Okla.
Kincaide, E. C., Gulf Pipe Line Co., Houston, Tex.
Manion, J. R., Sinclair Pipe Line Co., 45 Nassau St., New York City.
Mays, Henry B., Mutual Pipe Line Co., San Antonio, Tex.
McCracken, H. R., United Producer Pipe Line Co., Benedum-Trees Bldg., Pittsburgh, Pa.
McIlvain, R. W., Oklahoma Producing & Refining Corp., Tulsa, Okla.
Miller, W. A., Illinois Pipe Line Co., Findlay, Ohio.
Reed, Ralph J., Union Oil Co. of California, Los Angeles, Cal.
Shumaker, Charles, Crescent Pipe Line Co., Pittsburgh, Pa.
Sparrowlank, R. W., Oklahoma Pipe Line Co., Muskogee, Okla.
Swigart, Clyde, Standard Oil Co. of California, Bakersfield, Cal.
Towl, Allan T., Cumberland Pipe Line Co., New York City.
Vandergrift, J. W., Southern Pipe Line Co., 210 Seneca St., Oil City, Pa.
Williams, F. D., National Transit Co., Oil City, Pa.

POPULAR PREJUDICES ARE ANALYZED BY PEW

(Continued from Page 208)

uncertain and undependable supply of oil, and at an enormously increased price.

The oil industry is the entire business, and the costs of dry holes, and the operations of the small producer, and the operating of the small wells are not only necessary, but are a necessary part of the cost of every barrel of oil.

New Jersey Company Example

I will cite only the example of one company, and that of the largest one in the business, one of the most successful ones—the Standard Oil Co. of New Jersey—to show that even under the most favorable conditions the business is not profitable to an extent comparable with many other investments, and this company has the capital that enables it to take advantage of opportunities that are denied the average company or individual.

As the Standard Oil Co. of New Jersey is probably the company most frequently cited as one which has taken from the public too much profit, and as this company is engaged in all branches of the industry, producing, pipe lines, refining and marketing, a few figures showing an analysis of its statements are important. In the five years ending January 1, 1923, this company earned a total average of $80,000,000 on an average invested capital for that time of $600,000,000, or at an annual rate of 13⅓ per cent. It has always pursued the policy of keeping a large part of its earnings in the business, and, as a result, it is able to help meet the demands of the industry in a manner that can only be met by a very large amount of capital invested in refining and marketing facilities. Were it not for the ability of a few large companies to absorb much of the overproduction during such periods, and to supply the demands of the public during periods of underproduction, both the producing oil industry and consuming public would be facing demoralization most of the time.

There are hundreds—probably thousands—of industries and institutions scattered throughout the United States, which have from year to year earned more money per dollar of investment than has the Standard Oil Co. of New Jersey. It is not infrequent for banking institu-

INDICATED DELIVERIES TO DOMESTIC AND FOREIGN CRUDE PETROLEUM TO DOMESTIC CONSUMERS

(Thousands of barrels of 42 U. S. gallons.)

Domestic petroleum by fields of origin—	January	February	March	April	May	June	July	August	September	October	November	December	1924	1923
Appalachian	1,981	2,310	2,563	2,553	2,134	2,282	2,022	2,365	2,219	2,261	2,086	2,194	26,970	27,734
Lima-Indiana	187	174	160	203	180	162	145	146	132	176	220	157	2,042	2,126
Illinois and Southwest Indiana	702	777	774	845	601	798	709	515	691	848	870	823	8,953	8,563
Mid-Continent	25,832	27,130	29,232	27,726	29,723	26,975	30,186	30,141	32,266	31,058	33,163	35,862	362,304	297,051
Gulf Coast	2,693	2,206	3,098	2,898	2,622	3,798	1,704	2,227	2,111	2,672	2,671	2,626	31,416	34,103
Rocky Mountain	2,668	2,463	2,753	2,657	2,862	2,703	2,713	2,397	3,247	3,683	2,933	2,711	33,790	29,640
California	19,761	19,504	18,078	19,241	18,725	18,499	18,557	16,825	17,673	20,161	17,181	18,208	222,413	250,085
Deliveries and exports	56,824	54,654	56,658	56,133	56,847	55,217	56,036	54,616	58,339	60,859	59,124	62,581	687,883	*649,379
Exports of domestic crude oil*	1,480	1,651	1,449	1,520	1,823	1,517	1,369	1,205	1,815	1,376	1,436	1,028	17,669	17,061
Deliveries	55,344	53,003	55,209	54,613	55,024	53,700	54,667	53,411	56,524	59,483	57,688	61,553	670,219	632,317
Foreign petroleum*	6,918	6,132	8,028	7,173	7,349	6,243	6,487	6,068	5,891	5,230	6,521	6,623	78,663	81,999
Deliveries of dom. and for. petroleum in the U. S. and territories*	62,262	59,135	63,237	61,786	62,373	59,943	61,154	59,479	62,415	64,713	64,209	68,176	748,882	714,316

*Revised. †Includes 18,000 bbls. produced in Alaska, Missouri and New Mexico.

INDICATED DAYS' SUPPLY OF PIPE LINE AND TANK FARM STOCKS OF CRUDE PETROLEUM

(Based on aerage daily rate for month of deiveries to domestic consumers and exporters.)

January	162	April	162	July	177	October		
February	160	May	167	August	180	November		
March	162	June	171	September	169	December		

NUMBER OF PRODUCING OIL WELLS COMPLETED*

January	774	March	1,088	May	1,657	July	1,593	September	1,126	November	1,007	1924	14,543
February	904	April	1,429	June	1,521	August	1,389	October	1,060	December	994	1923	16,906

*For States east of California, from The Oil and Gas Journal; for California, from the American Petroleum Institute.

tions to earn 40 per cent on their capital, or for manufacturing interests, and their accomplishment is highly commended by the localities in which they are situated. They generally have a mere handful of stockholders; but if one of the great oil companies, with thousands of stockholders, makes half as much on their investment, it is a subject for investigation at once.

Yet the business of producing, manufacturing, and marketing oil is not only essential to our very national existence, but on the average, is much less profitable than in the instance of the company cited.

Fake Promotions

3. Another misunderstanding by the public of the oil industry arises from the losses it suffers from the fake promoters, who seise upon the supposed profits of the business to sell their worthless stocks to the public. Arkansas has suffered much from this source, but any fair-minded person will not blame his losses in buying these stocks upon the legitimate oil operators. Thank God and the Federal Government that, for the present at least, this class of leeches are not able to operate, and many of them are where they belong—in the penitentiary. On the other hand the public will also have to be fair and admit that much of the present prosperity is attributable directly to the enterprise and energy of the legitimate oil operator in this midst.

Attitude of Politicians

4. In a previous address, I ascribed another reason for misunderstanding by the public, to the politician.

"There are at least three kinds of politicians in our executive and legislative positions. There is the fair-minded, able, and conscientious man who is trying to do his duty by all the people, without fear or prejudice, and who can generally see what this is and does it. In the hands of this man, the interests of the rich and poor alike are safe. If all officials were of this type, the best interests of the entire State and Nation would be well served.

"Another type is the honest, but uninformed, narrow-minded man. He is impractical as to business; he is easily influenced by the demagogue; he does not understand that there is any obligation to capital, or that protection of capital is necessary to secure its employment, as well as is the protection of labor; or that the prosperity of the one is dependent upon the prosperity of the other. This man may develop if his position is taken from ignorance; but he may do a great deal of harm to his constituents during his period of incubation.

"The third type is the demagogue who is willing to accomplish his own purposes, regardless of the ultimate results to the State. He will use any argument, take any position, take advantage of any statements whether they represent the facts or not, that will influence or strengthen his position. We have these men in public life in both State and national politics. They are a menace to the public interests. They keep themselves in power by handing out special privileges, which may or may not be needed, but which would not be tolerated if these same constituents were asked to pay for them by direct taxation. They do pay for them in the end in the increased cost of everything they buy."

In any case the public owes it to its own sense of justice to be as fair and just to this great, important industry, and to those who are engaged in it, as it is to any other citizen or class of citizens.

REFINERS CONVENE AT KANSAS CITY MARCH 3

(Continued from Page 23)

year, but will include discussions of some of the problems confronting the oil industry. Two nationally known business men whose names will be announced later will deliver the main addresses at the annual banquet to be held Thursday evening.

Kansas City oil men will be hosts at a dinner and smoker Wednesday evening to be given at the Kansas City Athletic Club. The visiting ladies will be guests at a theater party on the same evening. Other entertainment features sponsored by individual companies are planned for the three days.

Special Rates

The association has made arrangements with the railroads for special rates of a fare and half for the round trip. This concession in rate is assured provided 250 or more in attendance turn in certificates at the convention. Those attending are requested to secure a signed certificate when purchasing their tickets. When 250 of these certificates have been turned in at Kansas City, the holders will be entitled to half fare in returning home.

EASTERN REFINED OIL MARKETS CONTINUE FIRM

(Continued from Page 203)

has been getting about 10,000 bbls. of Venezuelan crude daily, or one cargo per week.

The following table shows estimated daily average receipts of crude and refined oil by water at Atlantic Coast ports from Gulf and Pacific Coasts of the United States, and imports, for the last three weeks; also monthly record for the last 12 months (figures in barrels):

	Week Ended		
	Feb. 18	Feb. 11	Feb. 4
Gulf Coast	316,000	277,000	249,000
Pacific Coast	37,000	42,000	61,000
Imports	90,000	166,000	134,000
Total	443,000	485,000	444,000

Daily Averages by Months

	Gulf	Pacific	Imports	Total
Jan., 1925	311,000	77,000	133,000	521,000
Dec., 1924	306,000	83,000	85,000	474,000
November	246,000	80,000	150,000	476,000
October	246,000	120,000	88,000	454,000
September	270,000	104,000	101,000	475,000
August	310,000	127,000	84,000	521,000
July	318,000	85,000	114,000	517,000
June	302,000	133,000	136,000	571,000
May	276,000	122,000	144,000	542,000
April	262,000	143,000	123,000	528,000
March	201,000	137,000	130,000	468,000
February	174,000	175,000	108,000	457,000

Imports are largely from Mexico, with occasionally a shipment from Venezuela, Trinidad or Peru.

FAMOUS 101 RANCH HAS SKIMMING PLANT

(Continued from Page 209)

A few good wells are located on other leases outside the ranch properties. The Magnolia's No. 3 Altaffer was mentioned in detail. The same company's No. 2 Robedeaux, SE cor. Section 32-33-3,, was the discovery well in the deep sand. It came in April 15 last year for 600 bbls., having been drilled only 14 feet in the pay which was picked up at 4,109 feet. Late in November it was making 450 bbls. and was deepened 3 feet, which doubled the output. A short time later it was drilled to 4,139 feet and the production jumped to 2,000 bbls.

The Marland Oil Co.'s No. 3 Miller in the northwest of Section 33 was an 800-bbl. well from pay sand at 4,069-72 feet. It was completed in August.

The two significant dusters in the field are the Magnolia's No. 2 M. Arketa, in the NW cor. SE of Section 4 and the same concern's No. 1 Robedeaux in the SE of Section 32. The former had a hole full of water in sand at 4,227-32 feet, which gives it a sand elevation lower than the Wilcox producer in Section 9. This failure was finished early this month. The other dry hole mentioned found such a steep dip to the west that it never reached the Wilcox horizon. Geologists who have worked farther west believe that the dip extends on west and that the Magnolia's well now drilling in Section 31 has practically no chance of success. The best prospects for extensions of the field are apparently to the northeast according to geology.

Following is the current drilling report of the Watchorn Field (locations are not given as they appear on the map): In the NE of Section 4-22-3, Magnolia's No. 2 Ely, drilling at 3,938 feet, and No. 3 Ely at 2,920 feet and No. 1 Diamond at 2,040 feet; in the NW, same section, Magnolia's No. 6 D. Miller, drilling at 2,385 feet, and No. 7 D. Miller, at 515 feet; in the SW, same section, No. 3-A Saunders, drilling at 1,095 feet and No. 4 Saunders, a rotary test, at 2,250 feet. The Watchorn Oil & Gas Co.'s No. 2 D. Miller, in the NW of Section 4, an old well drilling deeper, was going ahead at 2,510 feet; No. 3 was shut down at 2,950 feet and will probably be plugged; No. 5 was drilling at 2,405 feet.

In the SE of Section 5, the Magnolia's No. 2 Wolfe was drilling at 4,005 feet; in the NE, same section, the same concern's No. 1-A Altaffer was drilling at 1,660 feet. No. 4 at 1,725 feet and No. 1 B. Altaffer at 1,230 feet. In the NW quarter of Section 5, the Watchorn Oil & Gas Co.'s No. 1 Diamond was drilling below 3,200 feet. In Section 7, the Magnolia's No. 1 Barnes was down 1,990 feet; in Section 8, the same company's No. 1 White Mule was drilling at 2,040 feet, and in the SW of Section 9, its No. 1 Childs was below 2,200 feet. The Watchorn's No. 1 Derain in Section 9 was drilling below 2,250 feet.

In Section 27-23-3, the Magnolia's No. 1 was drilling at 175 feet. The same company's test in Section 31 was down 1,835 feet and drilling ahead; in Section 32, the Magnolia's No. 1 Robedeaux, SE cor. SW, was drilling at 3,965 feet, No. 4 in the SE quarter, was trying to drill by tools at 2,810 feet, and No. 5 was going ahead at 2,645 feet. In Section 33, SW quarter, the Watchorn's No. 3 was plugging back after deepening 5 feet, and was making 50 bbls. and some water; No. 5 an old well deepened was shut down at 4,132 feet, flowing 135 bbls.; No. 7 was deepening at 3,895 feet; No. 8-A was drilling at 3,180 feet; No. 10 had a fishing job at 3,635 feet and No. 12 was a rig. In the NE quarter, same section, the Watchorn's No. 1 Brown was drilling at 3,820 feet; the Marland's No. 2 M. Miller, in the NW quarter, was being deepened at 3,876 feet, and No. 4 Miller was drilling at 3,646 feet.

ENGINEERS CRITICIZE PROPOSAL OF DOHERTY

(Continued from Page 26)

companies doing the work. There are always go-betweens and political complications.

Mr. de Golyer believed there would be more unit operation in the future because it is an excellent thing for the company having the unit and becoming more necessary for a company to get control of as large an area as it can.

Mr. Fohs was elected chairman of the Petroleum Section for the coming year, succeeding Mr. de Golyer. Other officers elected were E. L. Estabrook, of Casper, Wyo., vice chairman, and C. P. Watson, of New York, secretary. J. V. W. Reynders, steel bridge builer of New York, was elected president of the American Institute of Mining and Metallurgical Engineers, and Mr. de Golyer was elected first vice president. Charles F. Rand, mine owner and engineer, was chosen treasurer.

TO HOLD HEARING ON REGULATING VACUUM

OKLAHOMA CITY, Okla., Feb. 23.—The Corporation Commission has sent notice to all oil and gas producers of the State that it will conduct a hearing on March 16 to consider the advisability of requiring all oil and gas producers who apply any degree of vacuum by the use of vacuum pumps or other contrivances to install in connection therewith a regulating device which will permit no greater degree of vacuum to be applied than is legally authorized.

The notice says that "other matters incidentally necessary to be considered in connection therewith" will be presented for discussion, "for the purpose of putting into effect, protecting, regulating and inspecting such appliances."

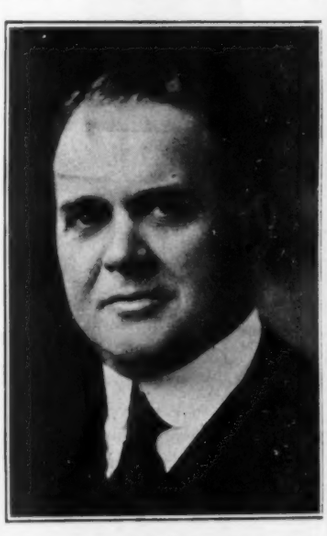
DEATH COMES SUDDENLY TO R. M. GOLDSBOROUGH

R. M. Goldsborough, vice president and general manager of the International Supply Co., was found dead in his bed at a hotel at Best, Tex., Friday morning. Heart trouble or a stroke of apoplexy apparently was the cause of death.

Leaving Tulsa Tuesday night for Best, on company business, Mr. Goldsborough was apparently in perfect health and spirits. He had not complained of any illness after his arrival at Best, but left a call for 6 o'clock Friday morning. When called he was found to have been dead at least two hours.

Mr. Goldsborough's home was in Pittsburgh, Pa. He had ben in the International Supply Co., only since the first of the year, having previously headed his own supply firm, the Titusville Supply Co., with headquarters in Pittsburgh. He was completing plans to move his family to Tulsa permanently when stricken.

Mr. Goldsborough was born in Armstrong County, Pennsylvania 48 years ago. He was a son of James R. Goldsborough, secretary of the Producers Protective Association, which was in charge of the famous one-year shut-down movement in the Pennsylvania fields during an overproduction period in the 80's. His father had moved to the oil country in the early days, locating at Bradford, Pa., where Mr. Goldsborough spent his early manhood. Having secured his oil training on the derrick floors of his father's wells in McKean County, Pennsylvania, he later entered the supply branch of the industry with whih he had since been continuously identified. His activities had taken him into practically every field in the country and he was widely known among the fraternity.



R. M. Goldsborough.

For a period of 10 years Mr. Goldsborough was connected with the Union Tool Co., six years of which were spent in Los Angeles as sales manager. In 1916 he was transferred to Chicago and placed in charge of the plant there, later being made vice president of the company. In 1920 he resigned and removed to Pittsburgh where he had since carried on his own supply business until his connection with the International Supply Co. recently.

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THE CHARLES N. HOUGH
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Products that cut down your underground overhead.

LARGE GASOLINE PLANT IS BEING COMPLETED IN THE PAPOOSE FIELD

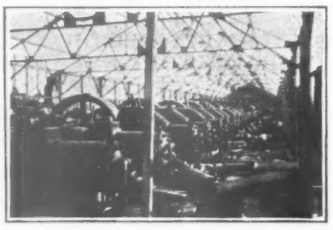
The Phillips Petroleum Co. is completing in the Papoose Field, about 7 miles west of Wetumka, Okla., a gasoline plant which will be one of the largest in the world from the standpoint of volume of gas handled daily.

The compressor equipment will consist of 20 Clark 165 horsepower Twin Gas Compressors. The entire battery of compressors is now installed and the walls and roof of the compressor building will be completed within a few days.

The plant will handle approximately 30,000,000 feet of gas daily. It is estimated that daily production of gasoline will be somewhere between 30,000 and 40,000 gallons.

With the completion of this plant, the Phillips Petroleum Co. will be one of the largest producers of natural, or more often called casinghead, gasoline in the world. It now has one other large plant equipped with 10 Clark 165 horsepower units in the Wewoka Field, which is only a short distance from the Papoose Field. This will give the company two large plants in this district, with a total estimated production of approximately 60,000 to 70,000 gallons per day. Within the past year the Phillips company has purchased a number of large gasoline plants, both in Oklahoma and Texas.

It is expected that the new Papoose plant will be completed and in operation about March 15.



View of incompleted plant.

Hauling one unit Clark twin compressor to new plant.

OIL BOARD TAKES UP MARKETING AND USE

(Continued from Page 25)

related factors which you will desire and are cordially invited to discuss.

"(1) (a) Do you note a growing demand by users of motor fuel for more miles to the gallon? (b) What factors, if any, are likely to bring about an increased demand on the part of the public for the elimination of waste? (c) In what way does the general demand as to engine performance influence the average fuel consumption? (d) To what extent would the public tolerate lessened convenience, comfort, or speed of operation in order to eliminate waste? (e) What would be the effect of increase in price of motor fuel on the average demand?

"(2) (a) What is the average consumption for motor vehicles, in terms of miles or ton-miles per gallon, by types? (b) Is there any practical method you can suggest of reducing the gasoline consumption of the 15,000,000 cars now in operation in the United States? (c) To what extent might it be reduced in new models of vehicles built along present conventional lines? (d) Granted that the European types of small bore, high speed, high compression motor, produces more passenger miles in small cars, what is the likelihood of American motor design following foreign tendency? (e) How would modification in design permitting greater fuel economy affect the aggregate demand for motor fuel in the next few years?

Efficiency in Motors

"(3) (a) Is there a practical method yet known for the modification of motor fuel to eliminate waste, having regard to the crude oil required for its production? (b) What new processes are in sight promising the direct use of crude or fuel oil, or other heavy fuels, in automotive engines? (c) What would be the results in service of a decided reduction in average fuel volatility, thus increasing the amount available from a given amount of crude oil? (d) What characteristics of motor fuel determine its availability for use and the amount of waste involved directly or indirectly in its use? (e) Do the methods of specifying motor fuel qualities have a bearing on fuel waste?

"(4) (a) What are the outstanding unsolved technical problems, if any, which require solution in connection with measures for elimination of waste in motor fuel utilization? (b) What economic problems of a like nature are involved? (c) What is the future of the electric driven car and truck, and of the return of the horse, in the reducing of gasoline consumption?"

Among those to whom the letter was addressed are:

Agg, T. R., professor, Ames, Iowa.
Alden, H. W., Timken-Detroit Axle Co., Detroit, Mich.
Bachman, B. B., Autocar Co., Ardmore, Pa.
Begg, R. S., University of Michigan, 514 Cheever Court, Ann Arbor, Mich.
Brosseau, A. J., president Mack Trucks, 25 Broadway, New York City.
Bowles, Col. James T. B., Tide Water Oil Co., Bayonne, N. J.
Buckhardt, O. M., Pierce Arrow Motor Co., Elmwood Ave., Buffalo, N. Y.
Bush, R. D., California State Mining Bureau, Ferry Bldg., San Francisco, Cal.
Crane, H. M., General Motors Corp. 224 W. 57th St., New York City.
De Waters, E. A., Buick Motor Co., Flint, Mich.
Ford, Henry, Ford Motor Co., Dearborn, Mich.
Henry, Guy P., Studebaker Co., 1412 Madison Ave., Detroit, Mich.
Horning, H. L., Waukesha Motor Co., Waukesha, Wis.
Huff, Russell, chief engineer, Dodge Bros., Detroit, Mich.
Hunt, O. E., Chevrolet Motor Co., General Motors Bldg., Detroit, Mich.
Hupp Motor Co., attention Mr. McPherson, engineer, Detroit, Mich.
Johnston, E. A., International Harvester Co., 606 S. Michigan Ave., Chicago, Ill.
Kettering, C. F., research department, General Motors Co.
Little, T. J., Jr., Ford Motor Co., 733 Seyburn Ave., Detroit, Mich.
Mock, Frank E., Stromberg Motor Devices Co., 64 N. 25th St., Chicago, Ill.
Newcomb, E. C., Standard Engineering Co., 4399 Chouteau St., Chicago, Ill.
Storrs, Lucius, president Connecticut Co., New Haven, Conn.
Stratford, C. W., Associated Oil Co., 79 New Montgomery St., San Francisco, Cal.
Tice, F. S., Stewart-Warner Speedometer Corp., Diversey Blvd., Chicago, Ill.
Vincent, J. G. Packard Motor Car Co., East Grand Blvd., Detroit, Mich.
Watts, Frank E., Hupp Motor Car Corp., 2516 LaSalle Gardens So., Detroit, Mich.
White Motor Car Co., Cleveland, Ohio.
Wilkinson, John, H. H., Franklin Manufacturing Co., S. Geddes St., Syracuse, N. Y.
Wilson, R. E., Standard Oil Co., research laboratory, Lafayette, Ind.
Young, Prof. Gilbert A., Purdue University, Lafayette, Ind.
Henry, Thomas P., president American Automobile Association, Detroit, Mich.
Sutton, George W., automobile editor, American Motorist, 1108 16th St., Washington, D. C.

CALIFORNIA RECEIPTS AND PETROLEUM IMPORTS

Receipts of California crude and refined oils at Atlantic and Gulf Coast ports for the week ended February 14 totaled 333,000 bbls., a daily average of 47,571 bbls., against 559,000 bbls., a daily average of 79,857 bbls. for the week ended February 7.

	Wk. Ind. Feb. 14
At Atlantic Coast Ports—	
Baltimore	181,000
Boston	75,000
New York	77,000
Total	333,000
Daily average	47,571
At Gulf Coast Ports (none).	
Total Atlantic and Gulf Coast Ports	333,000
Daily average	47,571

According to figures collected by the American Petroleum Institute imports of crude and refined oils at the principal ports for the week ended February 14 totaled 1,342,000 bbls., a daily average of 191,714 bbls., compared with 1,700,000 bbls., a daily average of 257,000 bbls. for the week ended February 7.

	Wk. Ind. Feb. 14
At Atlantic Coast Ports—	
Baltimore	277,000
Boston	120,000
New York	269,000
Others	120,000
Total	806,000
Daily average	115,143
At Gulf Coast Ports—	
Galveston district	122,000
New Orleans and Baton Rouge	233,000
Port Arthur and Sabine district	135,000
Tampa	46,000
Total	536,000
Daily average	76,571
At All U. S. Ports—	
Total	1,342,000
Daily average	191,714

MINES AND OIL MEN BANQUET ON MARCH 5

Oil men and mining men from all sections of the country will gather on March 5, for the annual banquet of the Chamber of Mines and Oil, which will be held at the Biltmore Hotel, Los Angeles. Last year's attendance was over 600 and probably even more will be present this year, as there has been a steady progression in attendance since the first Chamber of Mines and Oil Banquet was held more than 10 years ago.

D. M. Folsom of San Francisco, assistant to the president, General Petroleum Corp., will act as toastmaster. J. Edgar Pew, newly elected president of the American Petroleum Institute and vice president of the Sun Oil Co., will deliver the principal address on "The Oil Industry and Its Relation to the Public." Other speakers and the subjects they will treat are as follows: A. C. McLaughlin, retiring president of the Chamber of Mines and Oil and vice president and general manager of the Associated Oil Co., "1924, a Retrospect;" A. B. Macbeth, president-elect of the organization and vice president and general manager of the Southern California Gas Co., "The Future;" Robert E. Tally, general manager of the United Verde Copper Co., "Mining in the Southwest," and W. W. Orcutt, vice president of the Union Oil Co. of California, "Our Petroleum Pioneers."

CALIFORNIA MARKETERS

LOS ANGELES, Cal., Feb. 21.—W. L. Standard of the Union Oil Co. was reelected president of the Independent Petroleum Marketers' Association of California at a recent meeting. Other officers are J. A. Brower, Vernon Oil Refining Co., vice president, H. H. Mann, South Coast Oil Co., secretary-treasurer, and C. S. Bessemyer, Gilmore Oil Co., D. J. Peters, Rio Grande Oil Co., H. R. Sheldon, Sierra Refining Co., George Zeeman, Harbor Refining Co., and John Vordermark, Torrance Gasoline Co., directors.

The Cross Cracking Process

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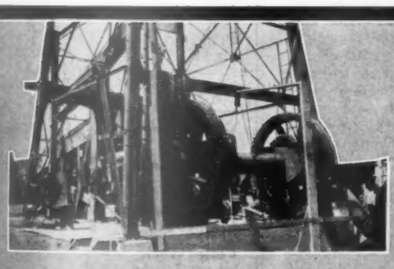

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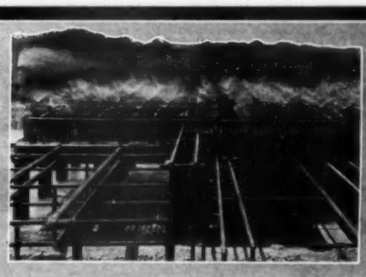
This goes for "you all."
Mr. Producer — (The foundation of the industry)
Mr. Cable and Rotary Driller—(The boys who blaze the trail)
Mr. Pipe Liner—(We need thee always)
Mr. Tank Builder—(Whadda ya gonna do if you haven't got storage?)
Mr. Refiner—(Who makes all possible)



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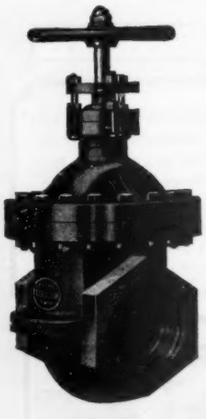

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27

INCREASING USEFULNESS OF PIPE STILLS

(Contiued from Page 112)

to fractionating towers and finished fractions are obtained without rerunning. The fuel consumption of this refinery, including the boilers, is surprisingly small and the operation has been most satisfactory from the start.

Pressure Still Work

Tube stills are especially well suited for pressure still work, and all of the more recently developed processes for cracking use tube stills. One of the chief reasons for this is the fire hazard of heating oil to a cracking temperature under pressure to a minimum. This is because only a small portion of oil under treatment, contained in tubes of small diameter, is exposed to heat from the furnace, and as the oil is positively circulated through the tubes, there is less opportunity for local overheating. As a consequence of this heat applied uniformly, producing less coke and fixed gas than would otherwise be the case, thus increasing the yield. Long periods of operation on stream are possible because so little coke accumulates in the tubes, and but a short time is necessary to remove the coke, which can be done from outside by mechanically operated tube cleaners without cooling the setting to the extent that would be necessary to remove the coke by hand from inside the setting. The temperature of the oil is under good control—much better than would be possible were a larger volume of oil being heated. This is important not only because of better operating conditions, but maintenance charges are less because of the absence of local overheating.

Fuel consumption is an important item in cracking oil, even when the fixed gas produced is burned to supply the necessary heat. The process can be made self sustaining without producing an undue amount of fixed gas if the gas is burned as fuel with good efficiency. To accomplish this the fuel must be completely burned under proper furnace conditions, and the greatest possible part of of the heat produced utilized. The fuel can be completely burned under proper furnace conditions, and the greatest possible part of the heat produced utilized. The fuel can be completely burned under proper furnace conditions in tube stills, and the best part of the heat produced utilized in heating the oil. This has made possible the claim made for some cracking processes that the process is self-sustaining in the matter of fuel.

Recovering Charging Stock

Tube stills are in use for recovering charging stock from pressure still bottoms for recycling. This is a difficult duty, requiring temperatures well above the cracking temperatures of the original stock. The oil to be treated is pumped through a tube heater at a high rate of speed and is heated to a temperature at which 80 to 90 per cent will evaporate in the vapor separator. The overhead is clean recycling stock, the bottom is sometimes reduced in gravity to 6 to 8 degrees Baume, but when blended can be used as fuel. Tube stills are also in use as benzine stills for rerunning pressure distillate. Vapor produced in the still is passed through fractionating towers, separating gasoline so completely that there is a gap of several degrees between the initial of the bottom and the end point of the overhead, thus insuring a maximum recovery. A small quantity of steam is used in the vapor separator to lower the boiling point and make a sweet product, but the quantity of steam used is but a fraction of the steam required to operate a steam still for the same purpose.

The term "pipe still" is somewhat of a misnomer as usually applied, because it refers to the heating element only of a complete distilling unit, consisting of an oil heater, where the heat is supplied, a vapor separating chamber, where the vapor is separated from the liquid oil which has not been evaporated, fractionating equipment, where fractions having different boiling points are recovered and cooled, and the final condenser.

(Continued on Page 218)

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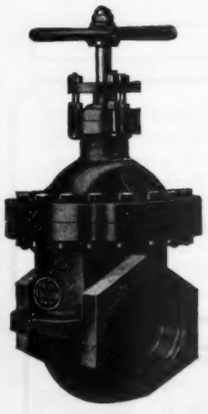

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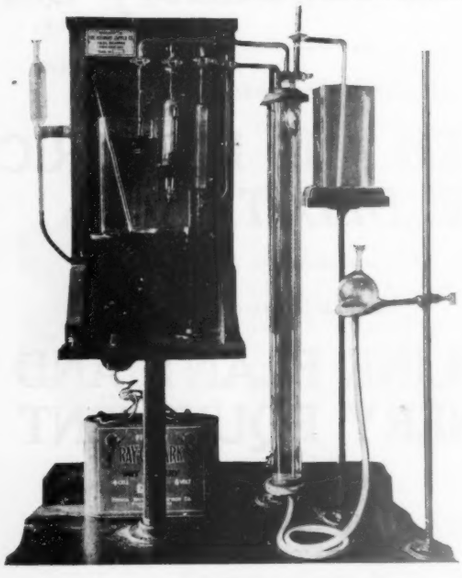

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CROSS CRACKING PROCESS DESCRIBED

(Continued from Page 109)

the bottom. The fractionating tower is an exceedingly efficient device whereby the gasoline is completely separated from the recharging stock, the recharging stock often having an initial boiling point of 420-425 degrees Fahrenheit.

The Tower Proper

The tower proper consists of 25 trays with bubble caps through which the oil vapors and the fixed gases pass in such a way that there is intimate mixture between the vapors and the oil which collects on the trays. This causes condensation of the heavier portions of the vapors and at the same time a revaporization of the lighter vapors in each of the trays, and since the temperature of the trays decrease uniformly towards the top of the towers a complete separation results. The vapors leaving the top tray pass first over the charging stock heating coil and some of them are condensed, returning to the top tray for further separation; the vapors passing this coil come in contact with a small watercooled coil which determines the temperature at which the vapors may leave the tower. The temperature of this coil is regulated by the amount of water flowing through it which in turn is regulated by means of an automatic temperature control device which maintains constant temperature of vapors passing over a thermocouple in the outlet vapor line. The temperature of vapors in the outlet vapor line determines the end point of the gasoline which is produced. A change in end point may be made by changing the setting of the automatic control so that it will maintain a higher or lower temperature.

The vapors which leave the tower pass through a condenser of the ordinary type, where they are condensed, the liquid and the fixed gases being separated in a gas separator. The gasoline is drawn off to storage while the fixed gases are burned in the furnace and supply sufficient heat for the cracking. The gases are remarkably free from gasoline, due no doubt to absorptive action while passing through the tower. The bottoms from the fractionating towers are drawn off to storage through a cooler and are used again as charging stock, usually being blended with the fresh stock from the refinery.

The gasoline produced will have the desired end point, the color varying from 16 to 23, depending on the skill with which the equipment is operated. The gasoline may be treated and rerun in the usual way but a sweet, 25 color gasoline is being obtained by means of a special treatment without rerunning.

Installing Plant

The plant described above is usually installed in units of 1,000 bbls. throughput per day; where more than one unit is installed they are grouped in pairs, the control for both units being in one control house. Recently a larger unit has been developed which will have a throughput capacity of 2,000 bbls. per day. The larger unit has been laid out in the same general way as the 1,000-bbl. unit so that they may be grouped in pairs also.

The Cross process is operating on a large number of different varieties of oils, including a California gas oil 13 degrees Baume, from which a yield of gasoline amounting to 65-66 degrees of the oil consumed is obtained, a Russian kerosene from which a yield of 74-75 per cent of the oil consumed is obtained, a North Texas oil 26-28 degrees Baume from which the yield is 60 per cent.

The Oil Bulletin of January, 1925, (p. 51) states:

"By the Cross process it is possible to more than double the amount of gasoline obtainable from a crude by usual refinery methods. From a total consumption of 9,538 bbls. of a 32° Be. California gas oil having an initial of 480° F. and an end point of 770° F. there was produced by the Cross process 7,179 bbls. of gasoline having an average gravity of 55° Be., an initial of 90° F. and an end point of 432° F. This represents a yield of 75.26 per cent. In addition to this gasoline there was produced 1,621 bbls. of fuel oil with an average gravity of about 16.5° Be. and a viscosity—Saybolt Universal at 150° F.—of from 100 to 110".

The residual fuel oil from the cracking is of excellent quality. A test on the fuel oil obtained by cracking the 26-28 degrees Baume North Texas oil mentioned above follows:

Specific gravity at 60° F.	.93
Be. gravity at 60° F.	10.1
Flash point	310°F.
Fire test	340°F.
Cold test	Below 0°F.
Sediment	Trace
Viscosity at 100° F.	67.0

The coke formed by cracking amounts to from one-half pound to one pound per barrel of throughput, and while salable is not produced in quantities sufficient to warrant effort in developing a market for it.

Operation

The Cross process is probably the most economical from the labor standpoint. The operating force for two units will consist of an operator or stillman, a house man and a fireman on each shift. The pressure control valves for the two units are brought down through the roof of the control house directly in front of the instrument board so that the houseman has control over every phase of the plant operations from the control board. The instruments on the control board include—

Indicating and recording pressure gauges for the reaction chamber pressure.

Indicating and recording pyrometers for the temperature of the oil in the transfer line.

Recording pyrometers for furnace, stack and the top of the tower, besides other instruments of less importance.

In the Cross process cracking is controlled by two variables—the pressure and the oil temperature. Ordinarily the throughput is made constant by setting the pump speed governor so that a certain amount will be pumped per hour. The oil temperature is controlled by the furnace temperature and the throughput, so that with the throughput maintained constant and the furnace temperature constant the oil temperature will be maintained constant. The pressure is regulated by the amount of opening of the outlet valve from the reaction chamber. Since the quantity of oil delivered by the pump is uniform, fluctuations of pressure which are caused by carbon deposits in the control valve occur but very slowly. The operator can adjust for this by very slight adjustments of the valve.

Starting the Oil

The plant after being thoroughly cleaned and tested is ready to be placed on stream. The fires are lighted and the oil is started circulating slowly through the system against a pressure of 150 to 200 pounds obtained by setting the block valve. As the oil temperature gradually increases the pressure also increases automatically. The speed of the pump is also increased so that when 700 degrees Fahrenheit oil temperature is reached it is at about three-fourths speed, and is at full speed when the cracking temperature is reached. During this time the towers have been bypassed, the oil returning to storage. The towers, which have been thoroughly steamed and drained, are now cut in and normal operation begins. About three hours have been taken up in getting on stream and normal operation now continues for from 6 to 20 days, depending on the stock, the degree of cracking required and other factors. During the run the operators are kept occupied mostly with maintaining uniform operating conditions such as furnace temperatures, throughput and pressure.

When it is necessary to discontinue the run, the fires are put out and the throughput decreased so as to keep the temperature of the oil at cracking temperature as long as possible. The pressure is gradually reduced; the oil is cut out from the towers and the towers dumped to their respective rundown tanks. When the furnace has cooled sufficiently the oil in the lower bank of tubes and the chamber is dumped and steam turned into them. Oil continues to be circulated through the top bank of tubes, which are not cleaned. The time between the cutting of the fires and this stage is about two hours. The steaming of the lower bank of tubes and chamber continues for five hours in the case of the tubes and 10 hours for the

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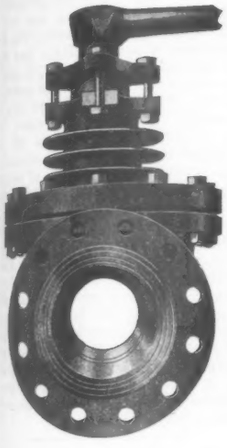

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chamber. The tubes and reaction chamber can be cleaned by a crew of five men during the daylight shift so that the time from stream to stream is usually 24 hours or less.

Maintenance

The principal causes of deterioration in a cracking plant are, first, overheating of parts of the equipment, secondly, corrosion, due to chemical compounds in the oil. The first cause is more or less subject to control by the operator, the degree of his control being dependent on the design of the plant. Corrosion due to sulphur in the oil, however, cannot be controlled by the operator but may be controlled by the method of handling the oil; in other words, the design of the plant may determine whether or not the corrosion will be more or less rapid.

Overheating of coils is caused by resistance to heat transfer; if the heat is conducted away from the interior of a tube as fast as it is put on the outside it is impossible to overheat the tube.

Heat transfer is decreased by carbon deposits on the inside of the tubes, also the heat transfer rate of a tube is decreased if the material passing through the tube is a gas instead of a liquid. The art of designing cracking plants has progressed to a point where the overheating of a tube due to carbon deposits indicates nothing else than careless operation. However, overheating due to having a tube more nearly full of gas than of liquid is not under the control of the operator at all, but is dependent entirely on the design of the equipment. By referring to Figure No. 7 it is easliy seen that at a pressure of 150 pounds per square inch and a temperature of 880 degrees Fahrenheit, all gasoline, kerosene, and most of the gas oil will be in the vapor phase. This means that in processes operating under these conditions of temperature and pressure the heat transfer in the last furnace tubes will be almost entirely free from gas on the exterior of the tubes to gas on the interior, a condition which is bound to be extremely hard on tubes. This condition is not subject to control by the operator at all. On the other hand, in the Cross process operating under pressures of 600 to 700 pounds per square inch, reference to Figure 1 shows that at a temperature of 880 degrees Fahrenheit all of the material in the tubes is in the liquid phase, the heat transfer high throughout all the tubes and the chances for overheating minimized.

Corrosion Reduced

In handling oils containing high percentages of sulphur, it has been found that vapor lines and the stills above the liquid level are corroded much more rapidly than liquid lines or the stills below the liquid level. It is easily seen that by keeping the heated oil in the liquid form corrosion from this cause will be much reduced.

A slow deterioration rate increases the safety with which a cracking plant may be operated. However, the refiner who contemplates the installation of a cracking plant will wish to satisfy himself with regard to the safety factors of the plant which he installs.

The Cross plant operating at 600 to 700 pounds pressure has an extremely high safety factor. The furnace contains 90 tubes, 45 in the upper or preheating bank, and 45 in the lower or final heating bank. The tubes are seamless cold drawn, 3 inches inside diameter and 4 inches outside diameter at a temperature of 1,000 degrees Fahrenheit, having a bursting pressure of 15,000 pounds per square inch. They will withstand a pressure 20 times what may be expected. The furnace tubes contain but 21 bbls. of oil. The reaction chamber is forged from a solid steel ingot, without seams or welds of any description. It is 38 inches inside diameter and 41 feet long overall; its minimum thickness is 3 inches, maximum 4 inches and it will withstand a bursting pressure of 9,600 pounds per square inch, which is 14 times what may be expected. There has never been a failure of a solid forged reaction chamber in any degree. All fittings, such as return bends and elbows, are steel forgings into which the tubes are rolled and then beaded over, avoiding as much as possible the use of gaskets.

Fuel Consumption

The heat required for cracking by means of the Cross process is supplied almost entirely by the fixed gases produced by the operation, thus fuel is needed only at the start of a run. The low fuel consumption is due primarily to the elimination of refluxing, and the saving of the heat of vaporization. The Cross process uses about 439 B.t.u. per barrel of oil cracked, amounting to 2.4 per cent of the oil charged. The fixed gases produced by cracking are sufficient to supply this amount of heat in most cases. During a period of five months 26 Cross unit swere operated with a consumption of fuel in addition to the gas of less than one-half of one per cent of the throughput.

The year 1924 has seen construction started on more Cross units than any one preceding year, notwithstanding the depression in the oil industry. The decision to install the Cross process was reached in many cases after thorough investigation of all types of cracking processes, operating under all conditions, by trained investigators. This indicates that the high yields of gasoline and low operating cost of the Cross process can be demonstrated in actual plant operation.

INCREASING USEFULNESS OF PIPE STILLS

(Continued from Page 214)

The refining of oil is essentially a distilling process, raising the temperature of the liquid to the boiling point, and boiling off the vapor which is collected and condensed. The distillation of water is simple in comparison because all of the liquid boils at the same temperature, which varies with the pressure, but the condensed vapor is always water having the same boiling point as the original liquid. Crude oil is composed of a mixture of liquids having a wide range of boiling points also varying with the pressure. The purpose in refining is to separate the liquid into fractions, each having a different range of boiling points, but as the pressure of the vapor of one fraction influences the temperature at which the next fraction will boil by altering the pressure or vapor tension, the process of separation is evidently difficult. The process is still more complicated, as compared with distilling water, because when the water is heated only steam is or can be produced, and it cannot be overheated at temperatures and pressures within the usual operating range, but when oil is heated the result is distinctly different. Oil is extremely sensitive to heat and can be easily overheated.

Heat Under Control

It is, therefore, most important in heating oil to have the supply of heat well under control and that the application of heat is gentle and uniform. It is difficult to accomplish this and at the same time burn the fuel with good efficiency, which necessitates that it be burned at a high furnace temperature, and the best part of the heat generated recovered in heating oil. This, however, is daily being accomplished in tube stills of later design, where more than 75 per cent of the heat of the fuel is successfully used to heat oil.

The reason for the success of the tube still, as a heating element, is that only a small volume of oil is contained in the tubes of which the heating surface is composed. These tubes are of small diameter and the oil is pumped through them, insuring a positive circulation. The rate of circulation is high enough to insure a turbulent flow of the oil, so that the oil particles are constantly being thrown about and are only momentarily in contact with the heating surface. The arrangement of tubes being flexible, the construction can readily be made suitable for a wide range of throughput, permitting at the same time the proper proportioning and arrangement of furnace and heating surface, the arrangement of one not being dependent upon that of the other.

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PLAN FOR REDEEMING CITIES SERVICE SCRIP

All of the scrip dividends which have been paid by the Cities Service Co. on its common stock will be redeemed March 1, 1925 to holders of record February 15, and a regular cash dividend of one-half of 1 per cent a month and a regular common stock dividend of one-half of 1 per cent per month have been declared payable as of the same date, according to a statement issued by the board of directors received by the Empire companies, Mid-Continent subsidiary.

At the same time the board announced it would present to the stockholders at the annual meeting in April a recommendation that 5 shares of new common stock be issued in exchange for each present common share, "including shares now to be converted" and that holders of bankers shares be given the opportunity to exchange on the basis of one share of the new common stock for two bankers shares.

Commenting upon the action, Henry L. Doherty, president of the Cities Service Co., said:

"The recommendation was based upon the conditions of the petroleum industry which have prevailed for more than three years. For most of that period the conditions in the oil business have been as demoralized as it was possible for them to be. In view of the marked improvement lately indicated by advancing oil prices, it was decided to adopt a conservative dividend program until such indicated improvements should be shown to be permanent.

"There has never been a time for the past 20 years when, in my opinion, conditions in this country were more promising for a long period of general business activity and prosperity; and the return of the rental value of capital to reasonable rates is a strong factor in the situation. I cannot see a single cloud in the business sky that can be regarded as a serious menace."

EASTERN PIPE LINE REPORT FOR JANUARY

Receipts of crude petroleum from the wells by the pipe lines of the Eastern division during the month of January amounted to 1,761,768 bbls., which is a daily average of 56,831 bbls. This is an increase of 31,528 bbls., in the total and 1,017 bbls. in the daily average compared with the figures for the previous month, December. The daily average is 5,807 bbls. less than the daily average for January, 1924.

The deliveries of crude petroleum during the month of January by the pipe lines of the Eastern division aggregated 4,894,563 bbls., the daily average being 157,889 bbls. This is an increase of 201,425 bbls. in the total and of 6,497 bbls. in the daily average when compared with the figures for deliveries for the preceding month. The daily average shipments were 12,371 bbls. greater than for January, 1924.

During January the runs of oil from the Illinois Field by the Tide Water Pipe Co. and the Illinois Pipe Line Co. amounted to 695,513 bbls., the daily average being 22,436 bbls. This is an increase of 54,594 bbls. in the total and of 1,662 bbls. in the daily average, when compared with the previous month. The total runs were 202,176 bbls. greater than they were in January, 1924. Deliveries of oil during January by these two lines were 572,305 bbls., a decrease of 23,637 bbls., when compared with the previous month and an increase of 291,513 bbls. in the daily average, when compared with the January, 1924, figures.

The amount of crude oil held in storage by the pipe lines of the eastern division at the close of January was 11,353,276 bbls., a decrease of 230,404 bbls. during the month. This is the smallest amount held in pipe line storage in this territory since May, 1924. The amount of Pennsylvania oil decreased 39,409 bbls. during the month, Lima decreased 54,409 bbls., Kentucky increased 13,005 bbls., Mid-Continent decreased 139,881 bbls. and Illinois decreased 9,705 bbls.

Always on the job!

The C-F Automatic Cut-Off

It automatically closes the ports of the regulator valve.

The valves have to be opened by hand before the flow of gas resumes.

No chance for dangerous explosions.

If the diaphragm of the regulator should burst, this cut-off would stop the flow of gas immediately.

More than thirty years of experience in controlling gas pressure has taught us how to make this device dependable in its operation.

The Chaplin-Fulton Mfg. Co.

Organized 1884—oldest builders of gas regulators in the country. Built in all sizes, from 1 inch to 24 inches; for all service, 1 oz. up to 1,600 lbs. pressure to square inch.

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Pittsburgh, Pa.

371

The Reid 24-Foot Diameter, 24-Inch Stroke, All Metal Band Wheel Power

Patented September, 1913, June, 1924. Other Patents Pending

The Positive Force Feed Oiling System, which assures a constant supply of lubricating oil to all moving parts and the Dust Guards on the wheel hub and eccentrics, to prevent the entrance of grit between the bearing surfaces, are two of the features insuring the owner of a REID 24-Foot Band Wheel Power many years of uninterrupted service.

The larger wheel means better service from the belt.

Let us tell you more about this power. Ask for Bulletin No. 29

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All plates of B & S Boilers are open hearth homogeneous steel of fire box and flange quality.

Horizontal seams of the barrel and connection sheet are triple riveted.

Surely, you need a Boiler that is powerful and rugged in *all its details.* Then specify B & S Boilers.

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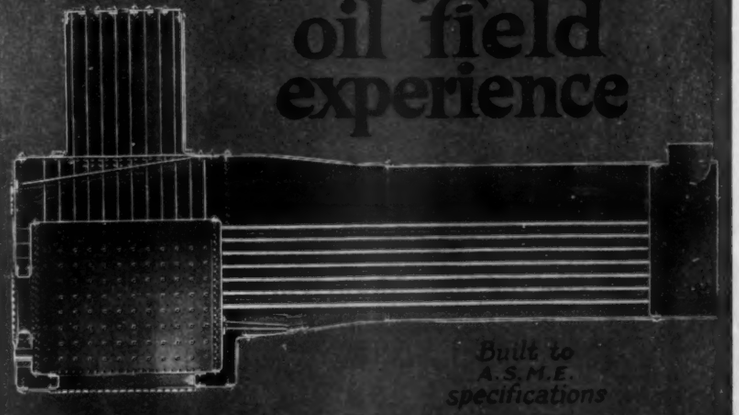

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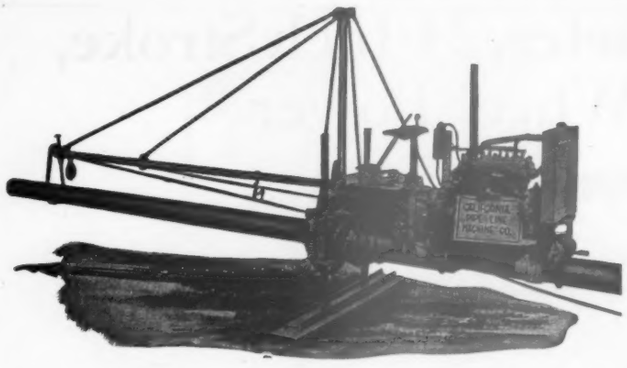

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CALIFORNIA Pipe Line Machine

This machine travels on the pipe. It is a simple, sturdy, always dependable device. Its work in the service of leading pipe line companies is its best endorsement.

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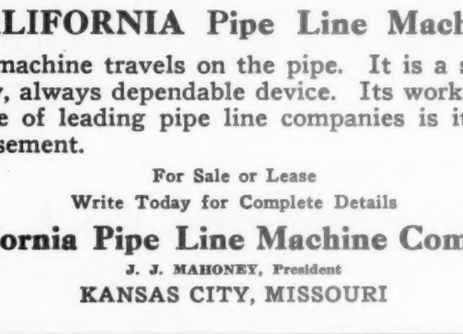
Type 6 furnished in both 3 and 4 KW capacity



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Only two points to oil, turbine end bearing and governor bearing, all mounted in a center compartment filled with oil.

This is the last word in oil country lighting.

THE MOON MANUFACTURING CO.

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MOON LIGHTING OUTFITS

NATURAL GASOLINE PLANT EQUIPMENT

(Continued from Page 201)

$W=3.463\ PV\ (R^{.29}-1)$,

in which W= the work done in foot pounds in compressing 1 cubic foot of air (gas) through the required range of pressure; P= intake pressure, absolute; V= the volume at the intake pressure P; and R= the ratio found by dividing the final or discharge pressure (absolute) by that of the intake pressure. And to reduce this to its simplest form, we have for horsepower required for any given case the following:

$H.P.=1.511\ PV\ (R^{.29}-1)$, in which V= volume of gas to be compressed stated in hundreds of cubic feet per minute. The use of this datum will serve in the case where the application of large bore compressor cylinders may be required to change the duty of an engine from that of compression to the duty of a vacuum pump. The formula applies for single stage compression, and this is all that will be required in the ordinary case of absorption process, since, when high pressure ranges are reached, each case of staging of such pressure may be treated as a simple compression problem in one stage.

Reduction of Gas Volume

The factor of reduction of gas volume by natural decline may be one which is responsible for somewhat too much of effort to provide many units of one capacity. It would be less a detriment in investment consideration if the units of compressor equipment could be reduced greatly in weight. Popular unit sizes for compression of flush field gases are now around 1,500,000 to 2,000,000 feet daily displacement capacity. They weigh anywhere from 60,000 to 80,000 pounds. The cost, therefore, of transportation and foundation to suit is very high. It would be better to reduce the weight very greatly, even at the cost of materially reducing the unit capacity. It is the writer's opinion that the weight of a unit of equipment suitable for the purpose can be conveniently reduced to say 20 per cent of that mentioned above and the capacity held for such a unit well above 50 per cent of the heavy type now available and that this will shortly be done.

The foregoing may serve well the phase of discussion, which is intended to be directed to the selection of one right line of equipment and its assembly at plant for operation. The right selection of all equipment might be thought the all-important step. It is not entirely; success of operation depends almost wholly on wise application and use of equipment regardless (almost) of its character. It is well to recall an instance proving this conclusion. In a compression plant the removal of 1,300 lineal feet of 2-inch pipe from a bank of about 1,800 feet, which was being used to cool the gas stream, together with some minor changes in connection arrangement of this coil material raised daily condensate production in the accumulators from about 275 gallons to nearly 2,000. And so, following selection of approved equipment, the more-important matter to follow will be an arrangement and installation developed for maximum operative convenience and efficiency.

Capacity Production

Operating expense must be charged with salaries, repairs and maintenance of equipment, royalties, etc. It must, further, rightly, be charged with the loss of every gallon short of normal yield capacity of plant, the same to be measured against either elapsed time idle or failure to strip properly the gas passing the plant. This latter factor may so far exceed the salary factor in large plant operation as to make that seem negligible. Ten per cent of a day's production, when that production may run to 40,000 gallons of gasoline a day, may pay a whole week's operating wages.

Insurance against inefficient operation is in right equipment rightly arranged. Such provision is also assurance for the lowest possible salary expense for operation outlay. Such interruptions to operation as call for repair and main-

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The **Neco Pump**

(Working Barrel)

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tenance expense not only present the losses of production but also the cost of labor and materials of such repairs and maintenance and these have to be added. Consequently, losses of production due to inefficient operation may be the primary factors of operating expense, all others following in the scale.

The most effective type and arrangement, dependability and efficiency of equipment will return the largest production of gasoline; it will call, also, for the lowest possible outlay of operating labor expense and the smallest repair and maintenance outlay. How important, then, it is to build for attainment of these factors.

And, while the design and arrangement of plant cannot accomplish everything, what is left outside of it, as contributing success or failure, may be passed as of little significance, if indeed, it be anything but inexcusable error.

Period of Evolution

We are now at a period of rapid evolution in the business of large plant equipment. A hint has been suggested for the revision of power and compressor equipment. The writer has made use, with some sense of frivolity, of the expression that the "gasoline industry has been developed and built around a 2-inch pipe." That expression may be almost offensive because it cuts too closely to the actual truth. The fact was entirely excusable when the small lease operator could effect a worthy increase in his lease revenue by improvising out of his idle stock of such pipe a coil, and in this coil make some otherwise wasted gasoline.

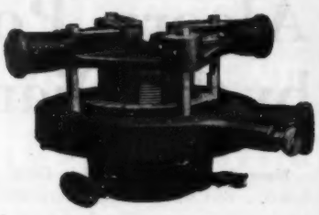
But the universal, undisputed use of 2-inch pipe to make cooling and condensing coils for gas has appeared to the writer almost a crime. Considered in its physical aspects in compression process it may not have been, so much as it appeared, a crime and for the following reason only: We were treating highly saturated casinghead gases. Two to fifteen gallons per 1,000 feet yield was about the limit range. Consequently, when we carried the gas stream in parallel with the cooling water flow, we carried along also the first condensate occurring with initial gas contact with the cooling effort. It is to be hoped that the flow of this condensate stream along with the gas may have afforded a medium for partial absorption and that our effort cannot be charged with the wantonness of total misplacement.

In the case of absorption, however, no such alibi can be set up. And to flow the gasoline in parallel (heat-wise) with the water medium for cooling is, strictly speaking, inexcusable. Nor, for reasons well known to the engineer, can the defect be overcome and continue the use of the 2-inch pipe and the conventional return bend. All this presupposed the use; of course, of the also concentional open louvred tower and the spray distribution of water on exposed atmospheric coils.

Design of Condensers

Recently condensers of rational design have been offered and they are rapidly coming into usage. How much these simplify and improve the arrangement and security of plant, we shall see. In the first place, 2-inch pipe bore is too large for effective gas contact with the wall of the tube and the cooling medium. An excessive surface ratio must thus be provided and the cost increased per unit of work done. Secondly, weight of equipment, calling for more expensive foundation and support to rack the pipe in position adds further to unnecessary cost. In the third place, the pipe being exposed to wide moisture, air contact and temperature change, depreciates so rapidly that replacements have to be made sometimes as often as once in three or four years. Few lines of productive industry will stand the strain of such rapid replacement of equipment. Fourthly, even distribution of cooling water is difficult of accomplishment and maintenance. In fact it is not usually found possible to keep the flow and distribution of water all over the pipe in continuous operation and after a few weeks of effort in that direction, operating forces become indifferent and let down to that degree

(Continued on Page 226)



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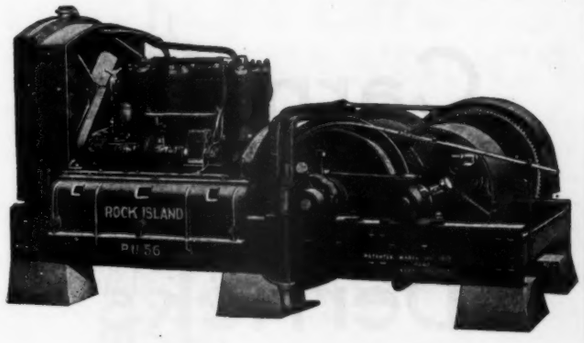

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You have less trouble—get more continuous performance right from the start in pumping and cleaning your wells, by installing a

Rock Island Pumping Unit

This engine never loses control of the load. It can be started slowly and speeded up just as smoothly as an electric motor. No clutch—no transmission gears—friction transmission eliminates all clashing, jerking or grinding of gears.

Two sizes—25 and 35 h.p. Heavy duty Waukesha four cylinder motor operates on either natural gas or gasoline. Dixie Magneto with impulse starter, antifriction bearings throughout. Powerful service brake.

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Near the Tonkawa field in Oklahoma, a test well, bored where the surface indications "Looked good," stopped at 3400 feet without striking commercial production.

BUT STRUCTURE DRILLING with the Sullivan diamond drill picked up markers at several points on the acreage. Geologists drew a map. The "high point" was charted, and 1½ miles from the dry hole a well came in at 2066 feet with 200 barrels natural.

The "ALCORN" is only one of several new Mid-Continent fields being developed with the aid of Sullivan diamond drills.

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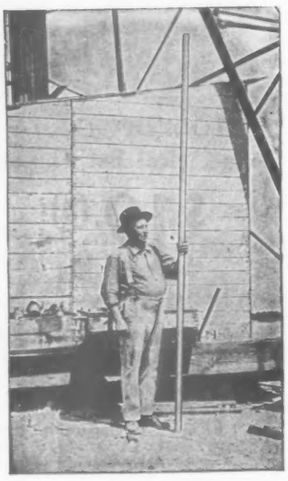

Sullivan Diamond Drills have been "standard of the world" since 1875.

Sullivan Contract Drilling Service, organized in 1884, is ready to put large or small outfits on your work anywhere, any time.

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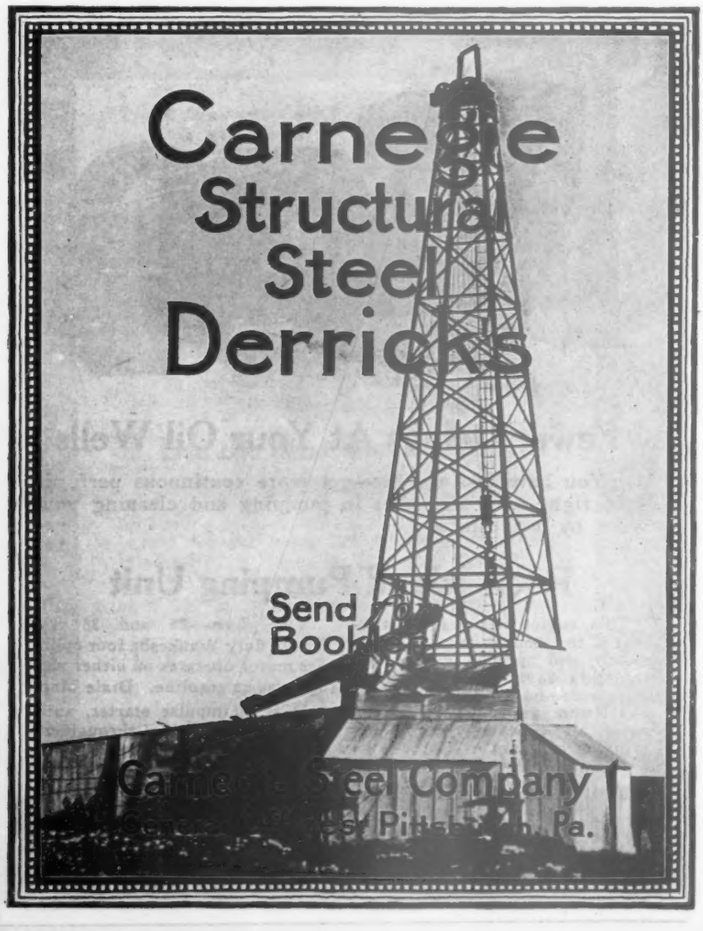

Burrell's Work on Gasoline Recovery From Natural Gas

The fact that most natural gasoline plants are isolated, and the further fact that every year many young men are entering the industry to advance the art, were two of the reasons why the treatise on "The Recovery of Gasoline From Natural Gas" by George A. Burrell, was made as complete as possible, embracing all the important features of the industry, including history, chemistry, testing, processes, engineering features, depletion and a discussion of motor fuels.

The volume, which consists of 600 pages, published by The Chemical Catalog Co., Inc., New York, is No. 20 in the series of monographs being published by the American Chemical Society. It traces the growth and development of the natural gasoline industry from its inception in 1903 and presents in detail the present and past practices of the industry as well as the theories and principles underlying those practices.

Since the construction and operation of plants and the use of different processes now in vogue are closely connected with plant equipment, and since good engineering practice is necessary for economical plant operation, the subjects of heat exchangers, gas engines, boilers, water cooling systems, pumps, fuel economy, and similar topics are discussed in considerable detail also.

Some space has likewise been devoted to a study of motor fuels other than gasoline because natural gasoline enters into the manufacture of most of these fuels, and the industry is vitally interested in them from the standpoint of competition. These include fuels used at the present time and those likely to be used in the future, such as alcohol, benzol, shale gasoline and various miscellaneous mixtures.

The statistical data included in the book cover the development of the natural gasoline and allied industries. Tables that are used continually in natural gasoline plant operation have also been incorporated in the volume.

A few of the specific subjects treated in the 47 chapters include: Special terminology used in the natural gasoline industry; origin, migration and accumulation of petroleum and natural gas; occurrence of gasoline in natural gas; applying vacuum to wells; gas leases; the compression method; oil absorption process; the charcoal process; initiating a gasoline plant; construction and operating costs; quality of gasoline, etc.

BUYS GATHERING LINES

BOWLING GREEN Ky. Feb. 21.—The Indian Pipe Line Corp. has purchased the gathering lines of the Paragon Development Co. in Warren and Simpson Counties, Kentucky, consisting of 100 miles of pipe, for a reported figure of $100,000. This will increase the Indian company's runs 20,000 bbls. monthly. The Paragon Development Co. will maintain its system in Barren, Cumberland and Monroe Counties.

RUMANIAN OUTPUT UP

The Rumanian crude oil production for January established a new record at 1,300,000 bbls. The monthly average for the last year was 1,100,000 bbls. The distribution of 1,000 acres of State lands, now about to be made, foreshadows greatly increased activity during the coming months. The land will be distributed only to Rumanian or so-called nationalized companies on the basis of the mining law enacted last summer.

ETHYL JURY EXONERATES

NEW YORK, Feb. 21.—Standard Oil Co. of New Jersey has been exonerated of all blame for deaths of its employes last December in connection with manufacture of tetraethyl lead gasoline. The jury also found there is no danger to the public from ues of such gasoline.

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Oil Well Specialties for Advanced Methods Practical and Dependable

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Montana's Production In 4 Years Is Given Value of $12,894,651

HELENA, Mont., Feb. 21.—The crude oil production of Montana in 1924 was 2,723,164.67 bbls., according to reports submitted to the State Board of Equalization. The value of the crude is placed at $3,618,213.36 bbls. The production last year showed some gain over that of 1923 which was 2,534,767.09 bbls. but the value of the 1923 production, $3,687,611.17 was higher than that of last year. In four years, or since oil was produced in appreciable quantity, the State has produced 8,923,551.54 bbls., valued at $12,894,651.35. Last year's production was greater than that of any previous year. The Cat Creek Field in four years produced 7,162,474.26 bbls. valued at $11,251,890.10 an average of $1.57 per bbls. The oil in that field has an average gravity of approximately 50 degrees and is very high in gasoline content.

The following table shows the results of developments in Montana in the past four years:

	Total Bbls.	Value
1924—		
Cat Creek	1,529,202.19	$2,439,277.76
Sunburst	1,187,404.84	1,168,329.95
Devil's Basin	105.00	157.50
Elk Basin	6,452.64	10,448.15
Soap Creek	.....	.....
Total	2,723,164.67	$3,618,213.36
1923—		
Cat Creek	2,080,826.12	$3,360,785.79
Sunburst	441,531.48	309,072.03
Devil's Basin	763.00	972.00
Elk Basin	9,696.49	15,801.35
Soap Creek	1,960.00	980.00
Total	2,534,767.09	$3,687,611.17
1922—		
Cat Creek	2,201,917.04	$3,366,529.58
Sunburst	28,987.48	40,582.49
Devil's Basin	1,363.50	2,727.00
Elk Basin	13,571.30	23,811.07
Soap Creek	27,134.80	14,831.65
Total	2,272,974.12	$3,448,481.79
1921—		
Cat Creek Field	1,350,528.91	$2,085,296.97
Sunburst Field	.....	.....
Devil's Basin	3,047.00	6,094.00
Elk Basin	24,350.09	40,971.25
Soap Creek	14,719.66	7,982.81
Total	1,392,645.66	$2,140,345.03

Summary of Total Production

	Barrels	Value
Cat Creek, 4 yrs.	7,162,474.26	$11,251,890.10
Sunburst, 3 yrs.	1,657,923.80	1,517,984.47
Devil's Basin, 3 yrs.	5,268.50	9,950.50
Elk Basin, 4 yrs.	54,070.52	91,031.82
Soap Creek, 4 yrs.	43,814.46	23,794.46
Total	8,923,551.54	$12,894,651.35

EXPORTS OF SUPPLIES SHOW ACTIVITY ABROAD

NEW YORK, Feb. 21.—Exports of oil well supplies and line pipe have been particularly heavy during the last few weeks. Venezuela seems to be the heaviest buyer. It is understood that most of the equipment is going to the La Rosa development.

Several shipments of oil well equipment have been made to England. This is to be reshipped to India for the Burmah Oil Co. Shipments have also been reported recently at Trinidad and Peru.

One shipment at the close of January, consisting of 253 lengths of line pipe, went to Venezuela. Another consisted of 400 bundles of sucker rods destined for Rangoon, India.

This all points to record drilling activity abroad this year based on prospects of a continued decline in United States crude oil production with higher prices, according to equipment men here.

The steamer Abron left New York February 4 with 4,448 cases of oil well supplies consigned to Batoum, Russia.

ALBERTA GASOLINE TAX

Official figures for the province of Alberta show a large gain in the provincial revenue from automobiles. Revenues from licenses totaled $847,630.50, a gain of $105,100 over 1923. The revenues from the provincial gasoline tax of 2 cents per gallon was $294,166.15, a gain of $52,918.38 over 1923.

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NEW YORK, Feb. 21.—Gulf Refining Co. has placed a large order for steel which will be used in building a new oil tanker, one of the largest afloat.

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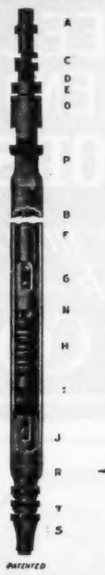

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NATURAL GASOLINE PLANT EQUIPMENT

(Continued from Page 223)

of usage which is easy of attainment and the scheme is allowed to lapse into a fair imitation of the conception of the designer. And, finally when winter arrives, unless the operating forces are coached thoroughly to avoid such result, the whole structure, coils and louvres are iced up and, if not broken down entirely or in part, are stressed and strained injuriously by some tons of suspended ice. And this merely refers to constructive detail. As to operative detail, in the same connection, there is much more to be said.

Expansion Factors

The application of heat to and its removal from the absorbent medium is one of the major functions of plant design and arrangement. For reasons altogether obvious, the expansion factors to be encountered in metal equipment must be respected. Aside from breaks occurring by reason of excessive stresses in the material of heat exchangers and stills, particularly, and their consequent dangers and losses to operation, there are the burdensome expenses of material and labor of repairs and replacements. Compromises are naturally made and sloppy, indifferent operation results. Leaks are countenanced, and while the losses due to them are not so great as most folks think, no pride can be had out of a leaky joint and the slovenly appearance entailed and fire hazards are multiplied.

The design and arrangement of such elements as are required for still and heat exchanger functions can easily be such that no such untoward consequences as the foregoing will result.

The circulation of oil and water call for only logical treatment, and while centrifugal pumps may be considered ideal for the purpose from some points of view, one is rather inclined to give serious consideration to reciprocating pumps for oil. The reason is not far to seek. The packing of the rods of centrifugal pumps rotating at high speeds is not a simple, easy matter in practice; although it seems to resolve itself usually to success after a period of amazing difficulty has been gone through with new machines. The makers of expensive packing usually profit by the breaking-in experience of each new centrifugal installation. It is rather to be anticipated that centrifugals have their permanent leadership place, notwithstanding the difficulties, chiefly because of their ready adaptation to load variation at will of the operative force.

Boiler Service

Boiler service has a large part to play. Selection of type should be governed largely in favor of ready access for cleaning. Appearance is a minor factor, but since installation is not of the temporary character called for in lease operation, there is no particular reason for selection of semiportable types, and better over-all efficiency of both fuel and operation can be had with a neat setting in brick, and certainly a more wholesome and pleasing appearance can be had with the latter, with less floor and building space. The equipment should be selected with the same judgment for large gasoline plants as for any other line of industry. Some influence will govern toward the type which can be transported over difficult roads, as such are the rule, not the exception, and the unit of maximum weight should not exceed that of the normal loading being handled, as, for instance, the heavier other parts of plant, compressor bed plates or pressure storage tanks for gasoline. Certain well designed types are offered which have steel housings and are bricked in on the ground. Others have built-in, brick-lined fire boxes. Some regard is best in selection to obtain a flue size that is replaceable with the tube sizes common to oil field boilers. All other features being equal, there are material differences in the accessibility for clean-out of fire box and tube shells, and for the reason that firemen of the fields are more familiar with fire tube types, it is advisable to

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select that type rather than the water tube type.

The problem of water softening for boiler service is also the same as it would be in any other line of industry or manufacture of like magnitude in boiler requirement

Unit division of boiler equipment is to be considered less in importance than the same for compressor equipment. This is also true of still and absorber equipment, but in the case of boilers, housing or setting detail is to be weighed carefully so the removal of a unit may be accomplished without disturbance to or marring appearance of the setting. Automatic control of fuel and water feed are as important in the gasoline plant as they are anywhere else, and unless water conditions are too severe, firemen can be dispensed with and boilers put in charge of stillmen.

REFINER'S INTEREST IN RESEARCH WORK

(Continued from Page 102)

yield from the crude, by this means, have been as much as 5 per cent (of the crude) and it would therefore be well within the mark to say that, based on the gasoline production of 1923, the possible increase in gasoline by this means alone would amount to more than 400,000,000 gallons annually.*

Also, the recently introduced process of "stabilizing" natural gas gasoline is scientific fractional distillation. The perfection of the processes for the extraction of gasoline from gas by absorption in oil under pressure, or by charcoal, has involved a great deal of small and large scale experimental work over the last 10 or 12 years.

There are, however, a great many research problems not so obviously related to profitable results. In fact there would not be the slightest question as to the value of research for the oil industry if it were not for the fact that in the wide spread of scientific investigation there are facts which are about as far removed from the useful as a star catalog of the southern hemisphere would be to a gold miner in Alaska. There is also a great deal of information and a very large number of possible investigations whose practical utility may fairly be questioned, but which may possibly lead to big things. Just where to draw the line as to what is worth while is the supreme difficulty. Such decisions are difficult for technical men themselves particularly when it comes to these border line problems where the chance of utility is small. The writer feels that in general the line has been drawn, in the petroleum industry, deep over on the conservative side. Yet nobody can charge the industry with being unwilling to take a chance where geological or geographical exploration for new oil is concerned and when one regards research as scientific exploration for new values, one naturally expects to see more research being carried out than is actually the case. However, there are many indications that the oil industry is taking a far greater interest in research than ever before. University investigators should do much more than they have collectively done in the past. They should do most of the work which is essentially of a theoretical nature, and such research is generally recognized as a proper university function.

Greater publicity of investigations done in the works should be stimulative. Our universities should be generally sprinkled with special research fellowships. The spirit of progress in the petroleum industry is evident enough in other lines; let us make sure that with respect to technical investigations we are at least as active as other branches of the business. As Sir William Bragg recently said, "It is our duty and our gain to explore." Not to do so simply reveals a wrong attitude of mind.

*Footnote: Taking roughly 5,000,000,000 gallons as straight run and an average of 2½ per cent increase based on the crude, or 8 per cent of the 5,000,000,000 gallons.

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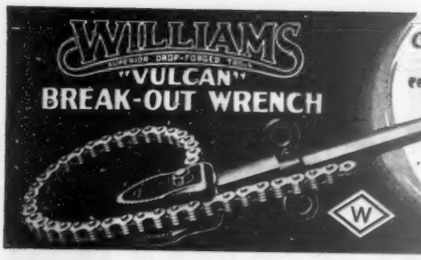

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NOVA SCOTIAN SHALES SHOW LARGE OIL YIELD

OTTAWA, Ont., Feb. 21.—Tests on Nova Scotia oil shales, particularly those of Pictou County, conducted at the Nova Scotia Technical College, Halifax, under direction of the Dominion Council of Scientific Research show that this shale yields 50 gallons of high grade paraffin base crude oil to the ton, according to an announcement just made.

The report stated that 100,000,000 tons of the shale are readily accessible over an area of 2,000 acres and that vast oil industries similar to those in Colorado and the western States may well come into being in this province. The tests will be continued by Prof. A. E. Flynn.

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Pages 194-195-195
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LEGALS

TRIBAL OSAGE OIL LEASES AT PUBLIC AUCTION, MARCH 18, 1925, BY U. S. GOVERNMENT

March 18, 1925, at Pawhuska, Oklahoma, about 56,000 acres will be offered for oil leases in quarter section tracts. Bids will be for bonus in addition to royalties, 25% payable on day of sale, balance in three annual installments, with acceptable security. Within advertised area there are about 9,250 oil wells producing from one barrel to two thousand barrels each, the total daily production for December, 1924, being about 90,000 barrels; also, there are about 125 wells drilling. All lands are now leased separately for gas. Blue print maps of area advertised, showing tracts producing oil or gas, can be had for fifty cents each, also logs of producing oil or gas wells for twenty-five cents each well. Write U. S. Superintendent, Osage Agency, Pawhuska, Oklahoma, for maps, logs, or other information.

DEPARTMENT OF THE INTERIOR, UNITED STATES LAND OFFICE, BATON ROUGE, LOUISIANA

Notice is hereby given that the following described land in the Caddo oil field, Caddo Parish, Louisiana, is offered for oil and gas lease under Sec. 17 of the act of February 25, 1920 (41 Stat., 437), at the standard royalty fixed for departmental leases varying from 12½ to 32½% of the oil produced, depending upon daily production per well, subject to reduction at discretion of lessor when average daily production of any well shall not exceed ten barrels per day; and 12½ to 16⅔% of casing-head gasoline, and an annual rental of $1 per acre, payable in advance, which will be credited against royalties as they accrue for that year.

TRACT A: Lot 4, Sec. 5, (14.10 acres), T. 20 N., R. 16W. There is a well situated upon this tract which has had a settled production of about ten barrels of oil per day for several years. By use of vacuum pumping a considerable volume of casing-head gas is being produced. This tract will be sold subject to a satisfactory guarantee by the successful bidder that he will immediately furnish and supply to said well satisfactory vacuum connection. Further guarantee as to a water supply will be required. This well is equipped with all machinery necessary to its operation, having an estimated value of $2000. This machinery is now the property of the United States and all bids are to be accepted subject to payment of the appraised price for machinery, an inventory of which may be seen on day of sale.

Said tract will be offered for sale at public auction at the Federal Court Room, Post Office Building, Shreveport, Louisiana, at 10 A. M. on March 10, 1925, and sold to the qualified bidder offering the highest bonus at the stated royalty. The successful bidder must deposit on day of sale a certified check upon a solvent bank or cash for one-fifth of the amount of each bid, and file the showing of qualifications to receive a lease as required by Sec. 15 of circular 672 oil and gas regulations, as to citizenship and ownership in other permits and leases. The remaining four-fifths of the bid must be paid upon issuance of lease. Plat showing location of tract offered and circular 672 may be secured from the U. S. land office, Baton Rouge, Louisiana, or General Land Office, Washington, D. C.

The bidders are warned against violation of the provisions of Sec. 59 of the U. S. Criminal Code, approved March 4, 1909, prohibiting unlawful combination or intimidation of bidders.

The right is reserved to reject any or all bids in the discretion of the Secretary of the Interior.

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